Action	Document	Start Date:	End Date:	Subject/Objective:	Responsible:	Summary:
Action 09-01	09-01_PQA2004470102.pdf	11/19/2004	11/19/2004	Failure analysis of overheated pencil coils	Sub-Supplier Fairchild (Pulse's supplier for IGBT)	IGBT overheated due to current related overstress
Action 09-02	09-02_MPV05-009.pdf (German Original) 09-02_MPV05-009_EN.pdf (English Translation)	9/1/2004	3/4/2005	Failure analysis of 8 failed pencil coils	Supplier Pulse	Coils were damaged by external influences; electrical overstress resulting from missing ground connection caused IGBT to overheat
Action 09-03	09-03_0001924068.pdf (German Original) 09-03_0001924068_EN.pdf (English Translation)	11/25/2004	3/23/2005	Component analysis of ignition coil	Audi AG	Exact analysis not possible because of damage degree
Action 09-04	09-04_11-Z-05-2207.pdf (German Original) 09-04_11-Z-05-2207_EN.pdf (English Translation)	4/14/2005	4/15/2005	Failure analysis of overheated pencil coils	Volkswagen Laboratory	IGBT latch-up, impaired capacitor soldering
Action 09-05	09-05_MPV05-018.pdf (German Original) 09-05_MPV05-018_EN.pdf (English Translation)	9/1/2004	4/25/2005	Failure analysis of overheated pencil coils	Supplier Pulse	Coil incorrectly wound, coil winding contacted outer shield causing an electrical short
Action 09-06	09-06_PQA2005180058.pdf	9/1/2004	4/27/2005	Failure analysis of failed/overheated pencil coils	Sub-Supplier Fairchild (Pulse's supplier for IGBT)	One coil with unidentified fault, another with IGBT overstress
Action 09-07	09-07_0002019864.pdf (German Original) 09-07_0002019864_EN.pdf (English Translation)	3/31/2005	4/29/2005	Component analysis of ignition coil	Audi AG	Functional test okay, corrosion visible on part
Action 09-08	09-08_0002031033.pdf (German Original) 09-08_0002031033_EN.pdf (English Translation)	3/31/2005	4/29/2005	Component analysis of ignition coil	Audi AG	Function test okay, corrosion visible on part
Action 09-09	09-09_11-Z-05-2623.pdf (German Original) 09-09_11-Z-05-2623_EN.pdf (English Translation)	4/27/2005	5/9/2005	Failure analysis of several failed pencil coils	Volkswagen Laboratory	Four coils were found to have a faulty / latched up IGBT causing component overheating; two coils showed epoxy fractures of unidentified origin
Action 09-10	09-10_11-Z-05-4271.pdf (German Original) 09-10_11-Z-05-4271_EN.pdf (English Translation)	7/19/2005	8/9/2005	Failure analysis of burnt pencil coils	Volkswagen Laboratory	Coils were found to be damaged by external heat; X-ray did not show component failure, coils were determined not to be the cause of the fire incident
Action 09-11	09-11_11-Z-05-4271_1.pdf (German Original) 09-11_11-Z-05-4271_1_EN.pdf (English Translation)	9/12/2005	9/19/2005	Analysis of unknown residue on pencil coils from Action 09-07	Volkswagen Laboratory	Inconclusive chemical analysis of residue
Action 09-12	09-12_0002087591.pdf (German Original) 09-12_0002087591_EN.pdf (English Translation)	6/23/2005	10/6/2005	Component analysis of ignition coil	Audi AG	EMC elements are destructed, three possible fault sources, exact cause un-determined
Action 09-13	09-13_R050203R001.pdf	11/3/2005	11/16/2005	Failure analysis of pencil coil	Supplier Eldor	IGBT caused coil system to overheat; failure possibly caused by faulty IGBT, moisture ingress or improperly installed pencil coil
Action 09-14	09-14_R060005R003.pdf	1/31/2006	2/20/2006	Failure analysis of pencil coil	Supplier Eldor	PCB failed probably because of moisture ingress; component overheated
Action 09-15	09-15_R060005R004.pdf	1/31/2006	2/20/2006	Failure analysis of pencil coil	Supplier Eldor	PCB failed probably because of moisture ingress; component overheated
Action 09-16	09-16_R060005R005.pdf	1/31/2006	2/20/2006	Failure analysis of pencil coil	Supplier Eldor	PCB failed probably because of moisture ingress; component overheated
Action 09-17	09-17_11-Z-06-1054.pdf (German Original) 09-17_11-Z-06-1054_EN.pdf	unknown	3/9/2006	Chemical analysis of oxidation/corrosion products	Volkswagen Laboratory	Inconclusive chemical analysis
Action 09-18	09-18_R060043R002.pdf	4/11/2006	5/16/2006	Failure analysis of pencil coil	Supplier Eldor	Moisture ingress caused electronics to overheat
Action 09-19	09/19_0002481715.pdf (German Original) 09-19_0002481715 _EN.pdf (English Translation)	11/14/2006	12/12/2006	Component analysis of ignition coils	Audi AG	One ignition coil overloaded, corrosion visible on part
Action 09-20	09-20_0002484263.pdf (German Original) 09-20_0002484263_EN.pdf (English Translation)	11/16/2006	1/1/2007	Component analysis of ignition coils	Audi AG	Ignition coils overloaded, corrosion visible on part

Action	Document	Start Date:	End Date:	Subject/Objective:	Responsible:	Summary:
Action 09-21	09-21_0002665668.pdf (German Original) 09-21_0002665668_EN.pdf (English Translation)	5/31/2007	6/12/2007	Component analysis of ignition coils	Audi AG	One ignition coil thermally overloaded
Action 09-22	09-22_R070177R001.pdf	7/11/2007	7/12/2007	Failure analysis of pencil coil	Supplier Eldor	Coil is burnt and fractured, no failure analysis possible
Action 09-23	09-23_R070170R001.pdf	7/6/2007	7/26/2007	Failure analysis of pencil coil	Supplier Eldor	IGBT in continuous mode due to moisture ingress that caused coil system melting
Action 09-24	09-24_R070174R001.pdf	7/6/2007	7/26/2007	Failure analysis of pencil coil	Supplier Eldor	IGBT damaged, coil system melted
Action 09-25	09-25_R070180R001.pdf	7/6/2007	7/26/2007	Failure analysis of pencil coil	Supplier Eldor	IGBT in continuous mode due to moisture ingress that caused coil system melting
Action 09-26	09-26_0002505374.pdf (German Original) 09-26_0002505374_EN.pdf (English Translation)	12/8/2006	9/17/2007	Component analysis of ignition coils	Audi AG	Analysis not possible because of damage degree
Action 09-27	09-27_R070253R004.pdf	9/20/2007	Sep 26, 2007, amended Nov 07, 2007	Failure analysis of pencil coil	Supplier Eldor	Coil epoxy cracked due to overheated IGBT, coil is not burnt
Action 09-28	09-28_R070292R001.pdf	11/5/2007	11/15/2007	Failure analysis of pencil coil	Supplier Eldor	Coil epoxy cracked, coil electronics inside coil head burnt, failure analysis not possible.
Action 09-29	09-29_MPA07-048.pdf (German Original) 09-29_MPA07-048_EN.pdf (English Translation)	1/31/2008	12/27/2007	Failure analysis of pencil coil	Supplier Eldor	External thermal overload caused insulation to melt resulting in an electrical discharge/short, probably because of malfunctioning or improperly installed spark plug
Action 09-30	09-30_11-Z-07-8717.pdf (German Original) 09-30_11-Z-07-8717_EN.pdf (English Translation)	unknown	2/12/2008	Failure analysis of pencil coil	Volkswagen Laboratory	Component overheating caused by IGBT latch-up
Action 09-31	09-31_11-Z-08-05170.pdf (German Original) 09-31_11-Z-08-05170_EN.pdf (English Translation)	6/26/2008	7/3/2008	Failure analysis of pencil coil, Total Loss	Volkswagen Laboratory	External investigator attributed total loss to ignition coil failure, Lab analysis proved that coils were only damaged by external heat; incident was not caused by ignition coils
Action 09-32	09-32_0003152409.pdf (German Original) 09-32_0003152409_EN.pdf (English Translation)	9/30/2008	11/25/2008	Componenet analysis of ignition coil	Audi AG	Analysis not possible because of damage degree
Action 09-33	09-33_11-Z-09-09728.pdf (German Original) 09-33_11-Z-09-09728_EN.pdf (English Translation)	12/16/2009	12/17/2009	Failure analysis of pencil coil, Total Loss	Volkswagen Laboratory	Coils exhibit extensive damage; conclusion may not be reliable Failure was possibly caused by defective resistor-capacitor circuit leading to increased current flow, that may have caused the fire
Action 09-34	09-34_11-Z-09-08765.pdf (German Original) 09-34_11-Z-09-08765_EN.pdf (English Translation)	11/18/2009	12/22/2009	Failure analysis of pencil coil, Total Loss	Volkswagen Laboratory	Failure was caused by faulty resistor-capacitor-circuit causing thermal overload at the power supply connector pin
Action 09-35	09-35_11-Z-09-09071.pdf (German Original) 09-35_11-Z-09-09071_EN.pdf (English Translation)	11/26/2009	1/4/2010	Failure analysis of pencil coil, Total Loss	Volkswagen Laboratory	Failure was caused by faulty resistor-capacitorcircuit causing thermal overload at the power supply connector pin
Action 09-36	09-36_11-Z-10-02246.pdf (German Original) 09-36_11-Z-10-02246_EN.pdf (English Translation)	3/9/2010	5/31/2010	Failure analysis of pencil coils	Volkswagen Laboratory	Failure was caused by defective resistor-capacitor circuit causing thermal overload at the power supply connector pin, Capacitor possibly damaged during manufacture
Action 09-37	09-37_0003391569.pdf (German Original) 09-37_0003391569_EN.pdf (English Translation)	7/3/2009	7/10/2009	Component analysis of ignition coils	Audi AG	Two ignitions coils overloaded, corrosion visible on part
Action 09-38	09-38_003410544.pdf (German Original) 09-38_003410544_EN.pdf (English Translation)	7/22/2009	7/27/2009	Component analysis of ignition coils	Audi AG	One ignition coil overloaded, corrosion visible on part
Action 09-39	09-39_003553332.pdf (German Original) 09-39_003553332_EN.pdf (English Translation)	1/27/2010	1/29/2010	Component analysis of ignition coils	Audi AG	Two Ignition coils functional test not okay, corrosion visible on part

Action	Document	Start Date:	End Date:	Subject/Objective:	Responsible:	Summary:
Action 09-40	09-40_11-Z-10-03225.pdf (German Original) 09-40_11-Z-10-03225_EN.pdf (English Translation)	3/9/2010	5/31/2010	Quality / failure analysis of pencil coils	Volkswagen Laboratory	Quality survey showed 45 out of 51 allegedly defective coils to be fully functional, 3 coils were found with short circuits, 3 with power output inconsistencies (one of them was an aftermarket part); report appears not be fire-related
Action 09-41	09-41_SF-Übersicht.xls (German Original) 09-41_SF-Übersicht_EN.xls (English Translation)	unknown	8/6/2010	Quality / failure analysis of ignition coils	Volkswagen Laboratory	Overview of analyzed warranty and other faulty parts, 50% showed 'no trouble found,' followed by 40% with misfires
Action 09-42	09-42_11-Z-09-01014.pdf (German Original) 09-42_11-Z-09-01014_EN.pdf (English Translation)	unknown	4/30/2009	Analysis of Aftermarket Pencil Coils	Volkswagen Laboratory	Aftermarket parts were identified on the US market that are made to be externally identical in appearance to OEM parts. These parts are not labeled and bear no manufacturer identification or part number. The parts are not properly assembled and some lack safety features including shut-down when subjected to continuous current flow. These are not able to provide proper or reliable ignition.
Action 09-43	09-43_11-Z-09-09730.pdf (German Original) 09-43_11-Z-09-09730_EN.pdf (English Translation)	12/16/2009	2/16/2010	Analysis of Aftermarket Pencil Coils	Volkswagen Laboratory	Additional aftermarket parts were found and analyzed. The coils bear no manufacturer identification, are poorly assembled and are not electrically functional.

Fairchild Semiconductor

8D Corrective Action Report

Device: ISL9V5036S3ST **PQA Number: 2004470102**

Working 8D

Date: 19. November 2004 **Author: Dan Copertino**

Customer Information:

Name: DELTEC AUTOMOTIVE GMBH & CO.KG
Location: DEU

Contacts	Name	Phone	Fax
	Viola Ehrhardt		

Part Number:

Reference Documents:

Reference Type	Reference Number
	6422
	6423
	6474
	6476

Summary/Abstract:

Deltec returned 4 devices for analysis that were encapsulated in epoxy resin and cut out of a module. The pieces returned showed signs of excessive heating that resulted in fractured and burned epoxy. The devices were tested and confirmed to be shorted gate to collector with the emitter being open. The devices were then decapsulated and visually inspected. Electrical damage was noted focused around the emitter bond wire with carbonized mold compound remaining on the die surface after several attempts to remove. The location and nature of the electrical damage, focused in the center of the die around the emitter bond wires, is indicative of a current related overstress.

Team Members:

Copertino, Dan	570-474-3721	Primary contact for this file
Platko, George	570 474 3239	
Novosel, Mike	570-474-6761	CQE
Reinkensmeier, Stefan	+49-8141-6102-108	
Wolfgang, Doser	49 8141 6102 113	

Problem Description:

Customer Claim: Devices failed

Device Info:	Package	Leads	Stampoff	ROM Code
	TO263	002		

Technology: DISCRETE IGBT (
Process: (IGNITION)
Division: Fairchild
Product Group: Power Discrete Group
Accounting Group: IGBT Ignition

Datecode	Die Run	Quantity	Top marking
0317	AF	1	N317AF
0321	AF	1	N321AF

Reported Fail Status: Field
Reported Fail Temperature:
Reported Test Condition:

Containment Actions:

None

Define Root Cause:

Findings During This Analysis:

Top Marking	Serial Number	Description
N317AF		Other
N317AF		MELTED, EVAPORATED, OR FUSED METAL, EOS
N321AF		Other
N321AF		MELTED, EVAPORATED, OR FUSED METAL, EOS

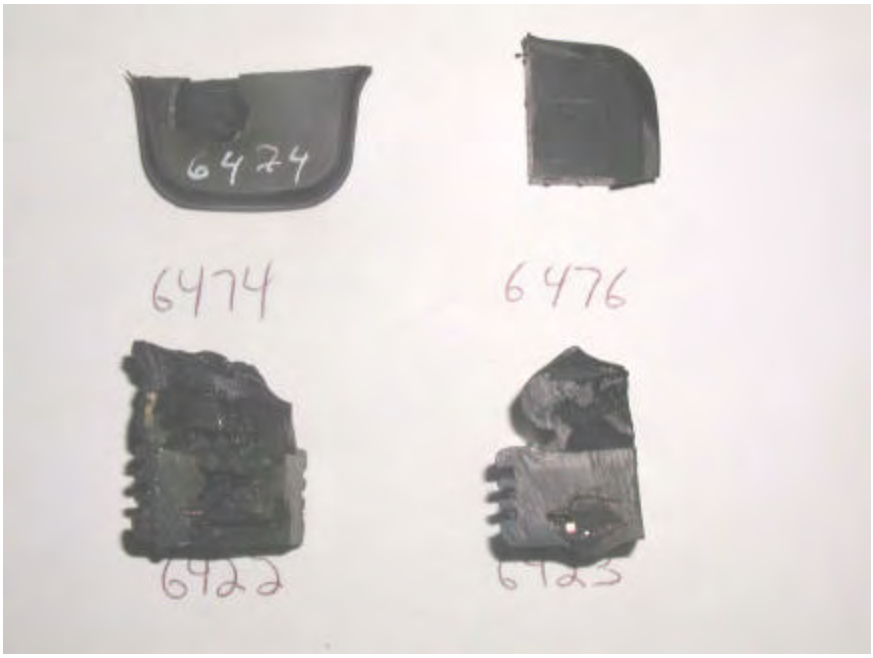
Process name: Initial Verification
Person responsible: Copertino, Dan
Step initiated date: 19 Nov 2004
Step completion date: 19 Nov 2004

ATE Verification:	Leads were soldered onto the exposed terminals of the devices and were then tested on a Tektronix 370A curve tracer. The devices were found to have open source indications and were shorted gate to collector.
External Visual:	The devices were encapsulated in epoxy resin from the customer. The epoxy on the devices was found to be burned and fractured.

Process name:	Failure Analysis 1
Person responsible:	Copertino, Dan
Step initiated date:	19 Nov 2004
Step completion date:	19 Nov 2004
Results Comments:	The devices were decapsulated in a jet etch machine. Several attempts were needed to completely remove the epoxy since it had been partially carbonized. The devices were then inspected under a microscope and signs of excessive heating was observed covering most of the die surface. The bond wire melted along with topside metal being reflowed. Carbonized epoxy also adhered to the bonding area and could not be removed without destroying some of the die.

Process name:	Root Cause Analysis
Person responsible:	Copertino, Dan
Step initiated date:	19 Nov 2004
Step completion date:	19 Nov 2004
Results Comments:	The severe burned and cracked condition of the epoxy resin upon receipt indicates the devices suffered from prolonged current flow and subsequent heating after the device shorted. The reflowed metallization observed on the die surface and localized heating around the emitter bond wires indicates the devices failed as a result of electrical overstress (EOS). The location and nature of the electrical damage, surrounding the emitter bond wires, is indicative of a current related overstress.

PQA Attachment by:	Copertino, Dan
Last Updated on:	19 Nov 2004



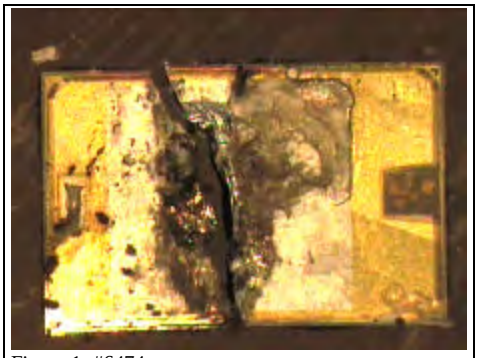


Figure 1: #6474
Electrical damage centered near the emitter bond wire area.

Figure 2: #6476
Electrical damage centered near the emitter bond wire area.

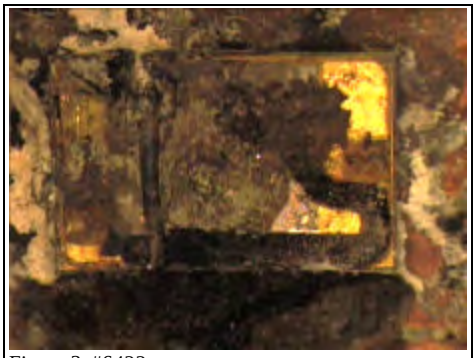


Figure 3: #6422
Electrical damage noted covering the entire die surface.

Figure 4: #6423
Electrical damage noted covering the entire die surface

Verify Corrective Actions:

NA

Implement Corrective Actions:

NA

Prevent Recurrence:

These EOS failures have been referred to our Test and Fabrication Engineering groups for their tracking and continued review. At the same time, we request the customer investigate their application for possible sources of an EOS event. If necessary, the Fairchild Field Application/Service Engineer may be requested via the local Fairchild Sales Office to assist in the investigation.

Closure:

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era PowerTrain	8D-Report	Berichts-Nr. : MPV05-009
Verteiler :	Audi : VW: era :	**Datum :** 04.03.2005

Erzeugnis :	Stabspule VW/Audi	**era-Nr. :** 11985ESM	**Eing.datum :** 01.09.2004
Herstellungsdatum :	s. Übersicht	**Kunden-Nr. :** 077 905 115 D	
Kundendaten :	**Beanstandungstitel :**	Feldrückläufer	**lfd. era-Nr. :** 6451-6458
	SAB-Nr. :	s. Übersicht	**Fehlercode :** 98 B
	Motor- / Fahrgest. Nr. :	s. Übersicht	

1. Team :

Abt. :	era PowerTrain-QS
Teamleiter :	Dr.Senftleben
Telefon :	02354 / 777-165
Mail :	h.senftleben@era.de

Beanstandung ist relevant für :		**Reklamation**	
Prozess-FMEA :	☐	**anerkannt**	☐
Konstruktions-FMEA :	☐	**abgewiesen**	x
Es liegt kein era-Fehler vor :	x	**offen**	☐

2. Beanstandungsgrund : Anschlussstecker beschädigt, Abschirmblech verbogen

Beanstandungsmenge :	8	**Wiederholfehler :**	**ja :**	☐	**nein :** x
Geprüfte Stückzahl :	8				
Fehlerhafte Stückzahl :	0				

3. Fehlerursache :

Bei allen 8 Rückläuferteilen, die aus ein und demselben Motor stammen, ist der IGBT mit dem Fehlerbild niederohmige Gateemitterstrecke defekt (s.auch Auszug aus dem Analysereport von On Semiconductor). Es handelt sich damit um das selbe Fehlerbild, welches bei zahlreichen 0km-Rückläufern aus Györ aufgetreten ist. Dieses wurde zurückgeführt auf eine (sporadische) Unterbrechung der Karosseriemasse während des Betriebs der Zündspule. Der Umstand, dass hier alle 8 Spulen in einem Motor ausgefallen sind, deutet auf ein Problem der Masseanbindung im Primärkabelbaum hin.

4. Sofortmaßnahmen : Keine

Einführungstermin : **Wirksam ab FD :**

5. Langfristige Maßnahmen : Keine

Einführungstermin : **Wirksam ab FD :**

6. Nachweis der Wirksamkeit der Maßnahmen :

7. Maßnahmen zur Vermeidung von Wiederholfehlern :

Erstellt durch :	E. Bonzol	**Tel. :**	02354-777-187	**Datum :**	04.03.2005
		Mail. :	e.bonzol@era.de		

lfd. Nr.	Eingangs-datum	SAB-Nr. (VW)	Motornr.	Fahrgestellnr.	Bremi-Nr.	Kunden-Nr.	Ind	L	FD T-Code	FD Tag	FD KW	FD Jahr	F- Code	F- Ind.
6451	01.09.2004	12-2004.08.18-f-001	7l4d000309	4,2 ltr. 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**
6452	01.09.2004	12-2004.08.18-f-002	7l4d000309	4,2 ltr. 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**
6453	01.09.2004	12-2004.08.18-f-003	7l4d000309	4,2 ltr. 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**
6454	01.09.2004	12-2004.08.18-f-004	7l4d000309	4,2 ltr. 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**
6455	01.09.2004	12-2004.08.18-f-005	7l4d000309	4,2 ltr. 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**
6456	01.09.2004	12-2004.08.18-f-006	7l4d000309	4,2 ltr. 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**
6457	01.09.2004	12-2004.08.18-f-007	7l4d000309	4,2 ltr. 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**
6458	01.09.2004	12-2004.08.18-f-008	7l4d000309	4,2 ltr. 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**

Auszug aus Analysereport von On Semiconductor

Summary Narrative: DELTEC AUTOMOTIVE GmbH submitted seven 20N35, N-Channel TO-220 Ignition IGBT 20 Amps, 350 Volts, 500 mJ Avalanche Energy transistors in customer's "coil" modules for analysis (the customer reported - field return , 7 transistor failed in the car / G-E shorts).
Electrical testing of the submitted S/N 4 IGBT found out the sample to be G-E shorted.
Inspection of two devices after chemical decapsulation showed similar electrical damaged sites between Gate pads and Emitter top metals with remelted metallization and carbonised mould compound on both the dice.
The extent of the damage makes it very likely that excessive voltage transient and possible subsequent thermal runaway resulting in the failures of the devices was the reason for the samples failures. If other units exhibit a similar failure mechanism please resubmit for further evaluation.

Root Cause Hypothesis: #1, …, 7 - Electrical overstress (EOS) related damage was suspected, most likely in form G-E high voltage transients with subsequent thermal runaways.

era PowerTrain	8D-Report	Report No. : MPV05-009
Distribution list:	**Audi :** **VW:** Mr Held, Mr Hepe, Dr Bennewitz, Mr Fricke, Mr Giere **era :** Dr Senftleben, Mr Teegler, Mr Fischer, Mr Gau, Mr Berghaus, Mr Laube	**Date :** 04.03.2005

Product :	Ignition coil VW/Audi	**era No. :** 11985ESM	**Received:** 01.09.2004
Manufacturing date :	s. overview	**Customer No. :** 077 905 115 D	
Customer data :	**Complaint:**	field return	**era No. :** 6451-6458
	SAB No. :	s. overview	**Fault entry :** 98 B
	Engine / Chassis No. :	s. overview	

1. Team : Dr Senftleben, Mr Teegler, Mr Fischer, Mr Gau

Dept. : era PowerTrain QS

Team leader: Dr Senftleben

Tel: 02354 / 777-165

E-mail : h.senftleben@era.de

Complaint is relevant for:		**complaint**	
Process FMEA :	☐	**recognised**	☐
Construction FMEA :	☐	**rejected**	x
There is no era fault:	x	**open**	☐

2. Reason for complaint: plug damaged, deflector bent

Number of complaints:	8	**Repeat faults:**	**yes :** ☐	**no :**	x
Checked amount:	8				
Faulty amount:	0				

3. Cause of the fault:

On all 8 returned parts from the same engine the insulated gate bipolar transistor (IGBT) is faulty with the symptoms low-ohm gate emitter distance (see also extract from the analysis report of semiconductor). It is the same fault that has led to many zero mileage returns from Györ. The cause was established as a (sporadic) disruption of the body mass when the ignition coil is operated. The fact that here all 8 coils have failed in an engine points to a problem of the earth connection in the primary wiring loom.

4. Immediate measures: None

Introduction date: **Effective from FD:**

5. Long-term measures: None

Introduction date: **Effective from FD:**

6. Proof of the effectiveness of the measures:

7. Measures to avoid repeat faults:

Created by:	E. Bonzol	**Tel. :**	02354-777-187	**Date :**	04.03.2005
		E-mail :	e.bonzol@era.de		

No.	Date received	SAB No. (VW)	Engine No.	Chassis No.	Bremi No.	Customer No.	Ind	L	FD T-code	FD day	FD week	FD year	F code	F Ind.
6451	01.09.2004	12-2004.08.18-f-001	7l4d000309	4.2 l 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**
6452	01.09.2004	12-2004.08.18-f-002	7l4d000309	4.2 l 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**
6453	01.09.2004	12-2004.08.18-f-003	7l4d000309	4.2 l 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**
6454	01.09.2004	12-2004.08.18-f-004	7l4d000309	4.2 l 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**
6455	01.09.2004	12-2004.08.18-f-005	7l4d000309	4.2 l 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**
6456	01.09.2004	12-2004.08.18-f-006	7l4d000309	4.2 l 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**
6457	01.09.2004	12-2004.08.18-f-007	7l4d000309	4.2 l 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**
6458	01.09.2004	12-2004.08.18-f-008	7l4d000309	4.2 l 228kW	11985esm	077905115	D	L1	xxxx	II / 1	4	2003	**98**	**B**

Extract from On Semiconductor analysis report

Summary Narrative: DELTEC AUTOMOTIVE GmbH submitted seven 20N35, N-Channel TO-220 Ignition IGBT 20 Amps, 350 Volts, 500 mJ Avalanche Energy transistors in customer's "coil" modules for analysis (the customer reported - field return , 7 transistor failed in the car / G-E shorts).
Electrical testing of the submitted S/N 4 IGBT found out the sample to be G-E shorted.
Inspection of two devices after chemical decapsulation showed similar electrical damaged sites between Gate pads and Emitter top metals with remelted metallization and carbonised mould compound on both the dice.
The extent of the damage makes it very likely that excessive voltage transient and possible subsequent thermal runaway resulting in the failures of the devices was the reason for the samples failures. If other units exhibit a similar failure mechanism please resubmit for further evaluation.

Root Cause Hypothesis: #1, …, 7 - Electrical overstress (EOS) related damage was suspected, most likely in form G-E high voltage transients with subsequent thermal runaways.

Audi
Quality assurance

Test Report FIELD

Complaint number	*Entry date*	*Factory*	*Complaint location*
0001924068	25.11.2004	26	USA

Damage part 077 905 115 H Ignition coil
Delivered part 077 905 115 H Ignition coil
Supplier 00001542 00 PULSE POWERTRAIN GMBH&CO.KG MEINERZHAGEN
AM ROTTLAND 12I 58540 MEINERZHAGEN, GERMANY

FSN	*Dept.*	*Telephone*

Parts manager
Damage assessor

SAGA code

Make	*Prod. daught.*	*ISO*	*DC*	*Partner*	*Task no.*	*Serial no. application date*
A	0200	USA	444	09D14	12428A	01

VIN	*Replacement part*	*Damage type BD*
WAUML44E45N003917	077 905 115 K	0040 0

Vehicle type	*Km reading*	*Delivery date*	*Repair date*	*Control data*
4E851L	3.000	24.09.2004	03.11.2004	110

Service no. 2820 ignition coil ***Type of damage*** 0040

No. of complaint items	*No. of work items*	*Part manufacture date*	*Comment*
1,00	1,00		

Complaint text
MSGT : 4E0910560J FD:L1 FD25 6 20/04
4.2L V8/5V G
17768 ignition coil control cylinder 2 - short to ground
16684 misfires detected

Complaint code	*Complaint code text*
E0000	Electrical fault

Fault code	*Fault code text*
E0000	Electrical fault

Originator	*Comment*	*From VIN*
Supplier	P1650 P1360 P0300	

QTS status	*Delivery status*	*Completion indicator*	*In usage date*
3 23.03.2005	10.05.2006		

Test report no.	*Costs to be borne by*	*No. of cost items*
05U50005	supplier 00001542 00	1,00

Cause/Action
Cause: Local overheating in the area of the electronic and therefore malfunction of the ignition coil. Because of the damage degree the cause cannot be exactly determined. The cause is with high probability an unclean soldering or rather solder splash. Details see enclosed analysis report.
Actions:
Optimized soldering process on basis of the current conducted analysis of the influencing factor on the soldering result (see also process monitoring)
14.03.2005

1 Aufgabenstellung
Radioskopie und CT
Bitte untersuchen Sie die abgetrennte Zündspulenelektronik auf mögliche Kurzschlussspuren bzw. Fehlerursachen.
Schaden: Zündspule ist überhitzt und gelängt, Kopf schief.
Fz. ID.3VWSF71K55M603138 Jetta USA

2 Zusammenfassung / 3 Einzelergebnisse
Die angelieferte Stabzündspule wurde in Anwesenheit des Auftraggebers radioskopiert und tomographiert.

Ergebnisse CT- / Radioskopie-Untersuchung:

- Der IGBT ist durchlegiert.
- Ein Keramikkondensator zeigt Auffälligkeiten im Bereich der Lötstützpunkte.

Die Ergebnisse sind in den Bildern 1 bis 19 dokumentiert.

Der Auftraggeber wurde am 14.04.05 vorab informiert. Das Bauteil wurde dem Auftraggeber für weitere Untersuchungen zurückgegeben.

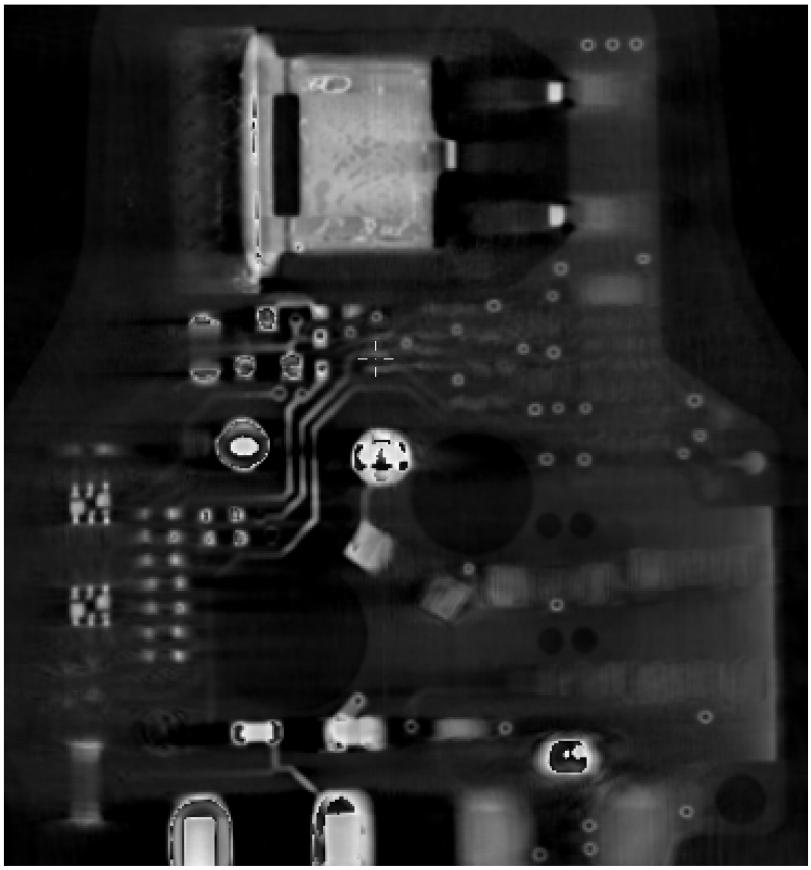


Bild 1: CT-Schnittbild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA, durchlegierter IGBT

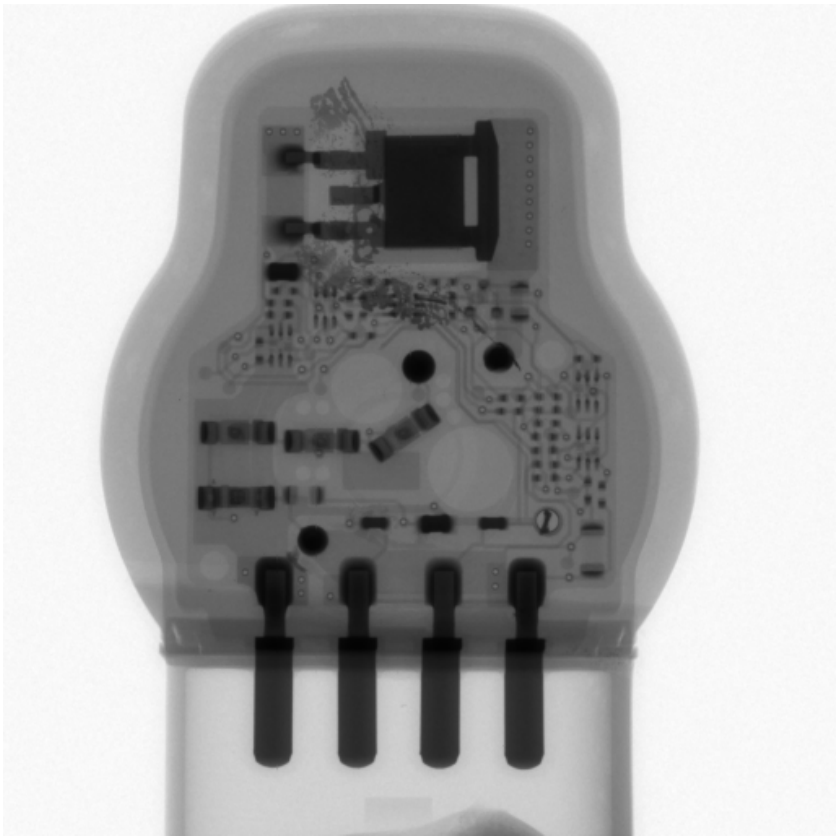


Bild 2: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA

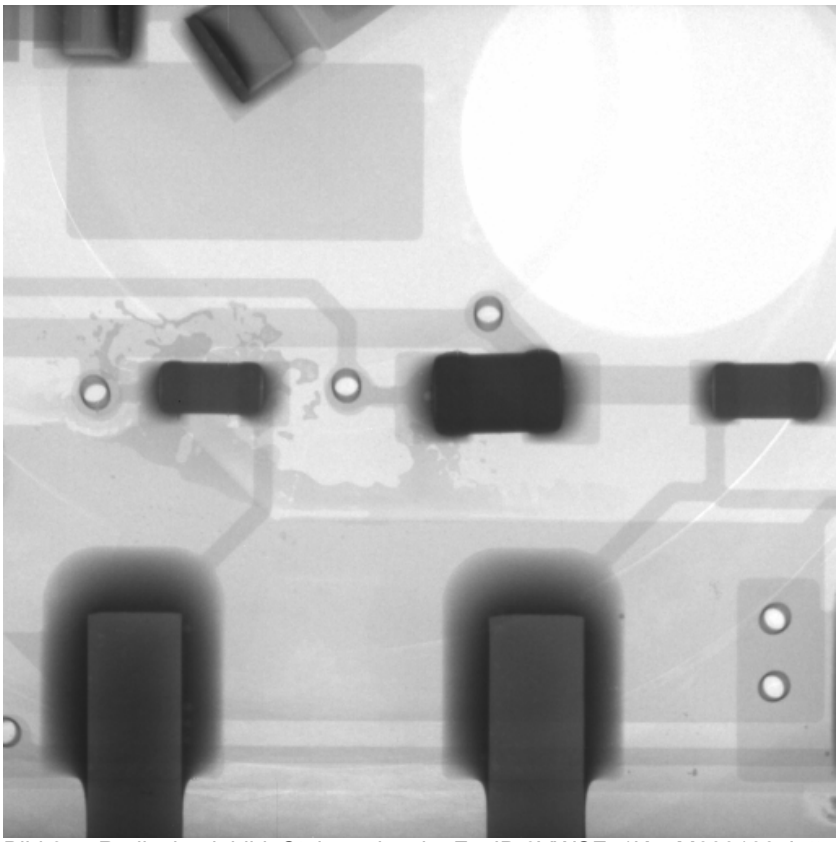


Bild 3: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA, Auffälligkeiten im Bereich des Kondensators

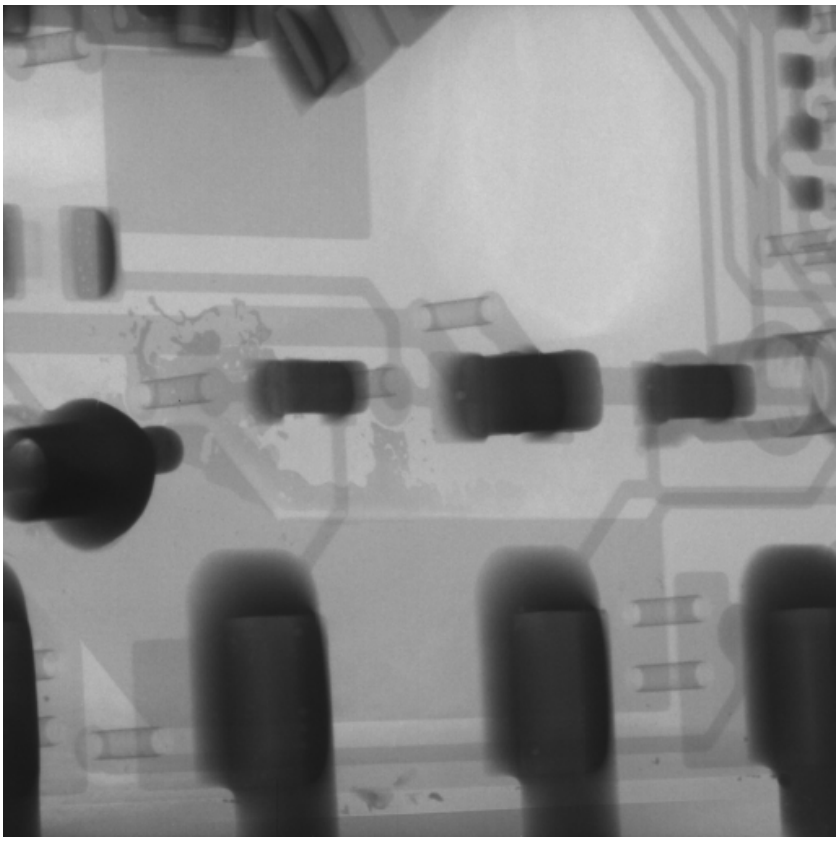


Bild 4: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA, Auffälligkeiten im Bereich des Kondensators

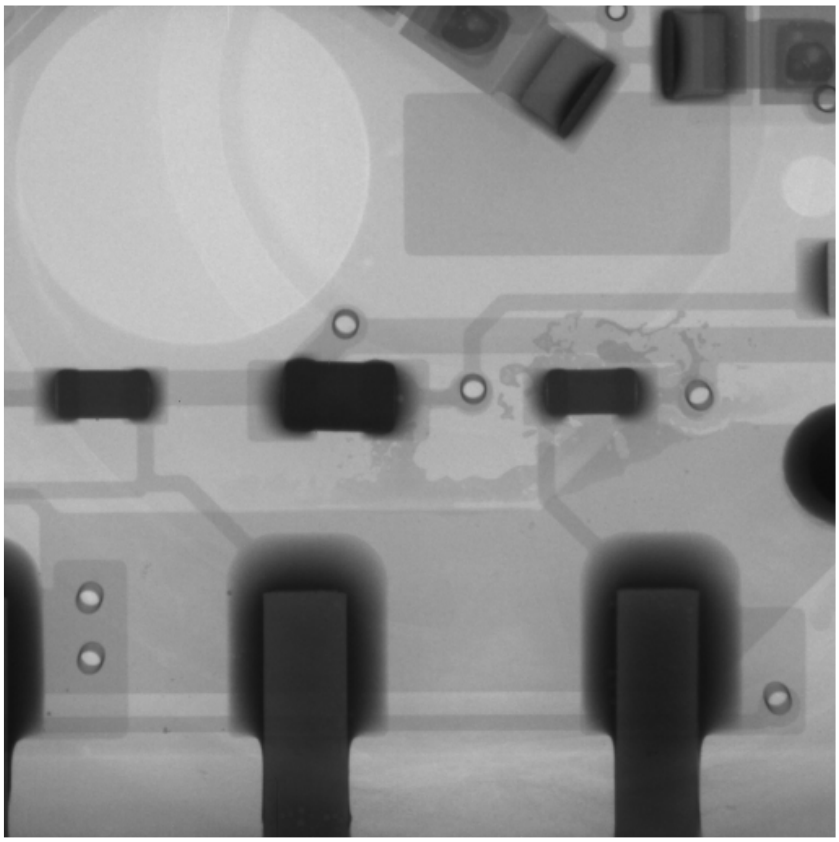


Bild 5: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA, Auffälligkeiten im Bereich des Kondensators

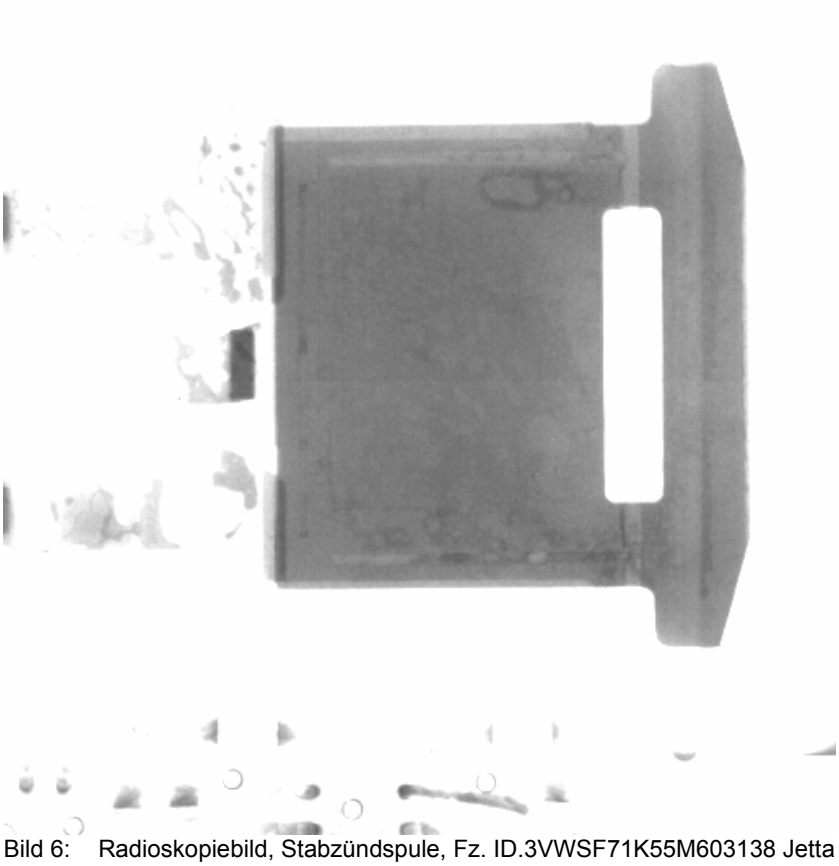


Bild 6: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA, durchlegierter IGBT

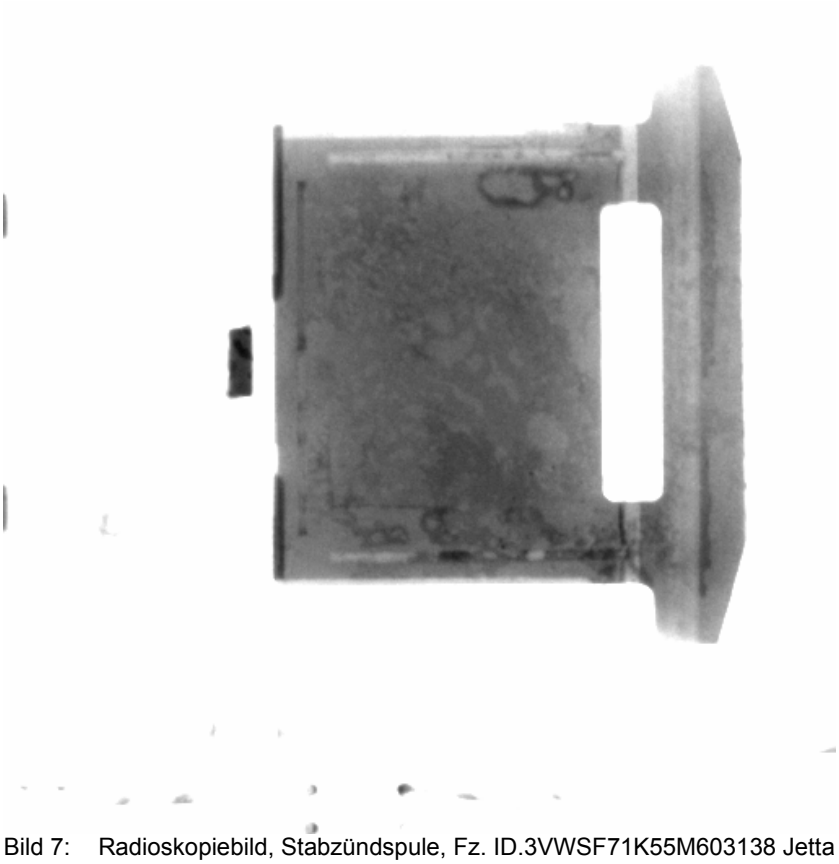


Bild 7: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA, durchlegierter IGBT

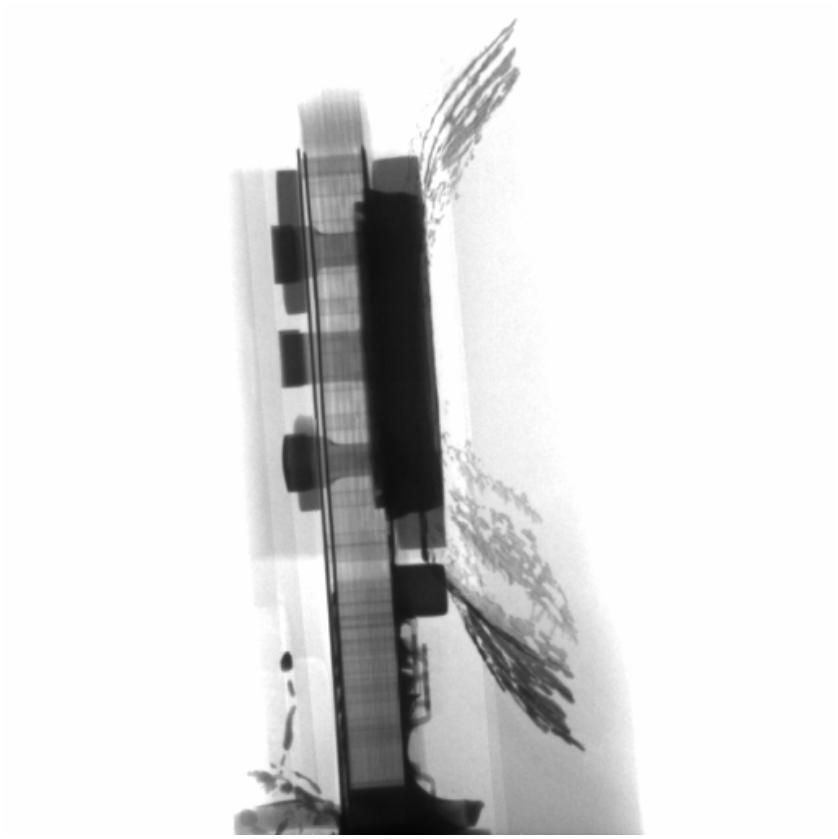


Bild 8: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA,

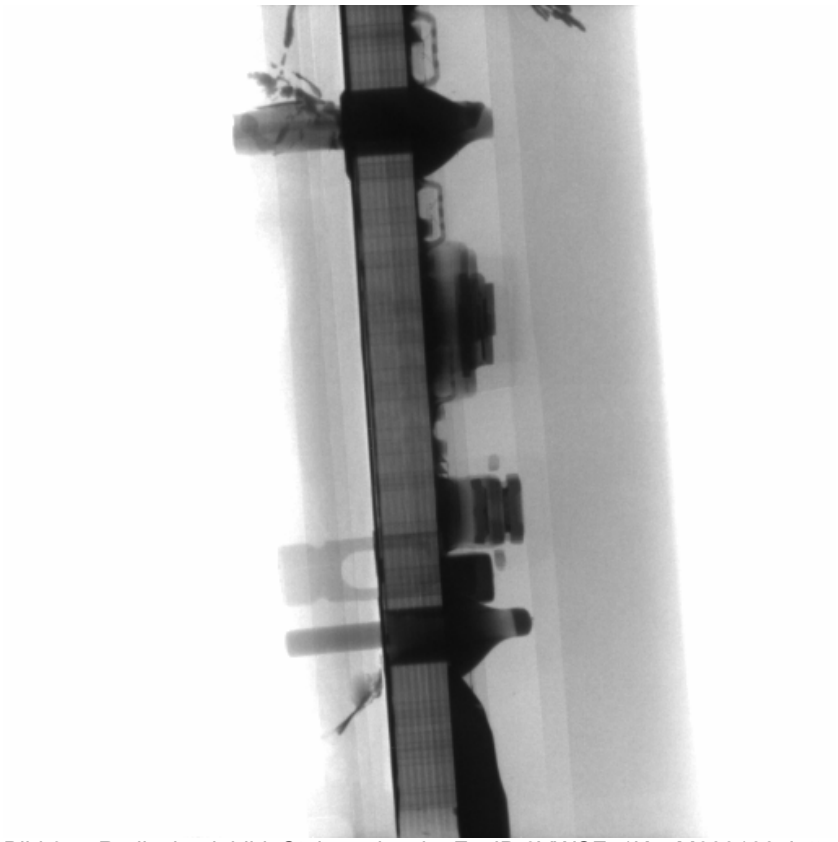


Bild 9: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA,

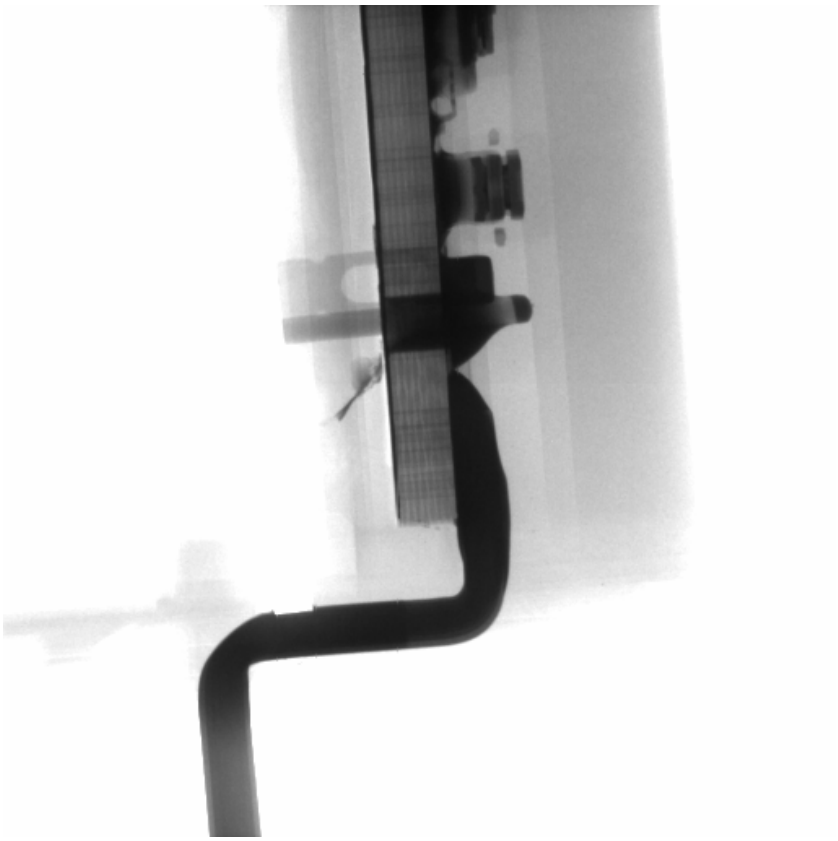


Bild 10: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA,

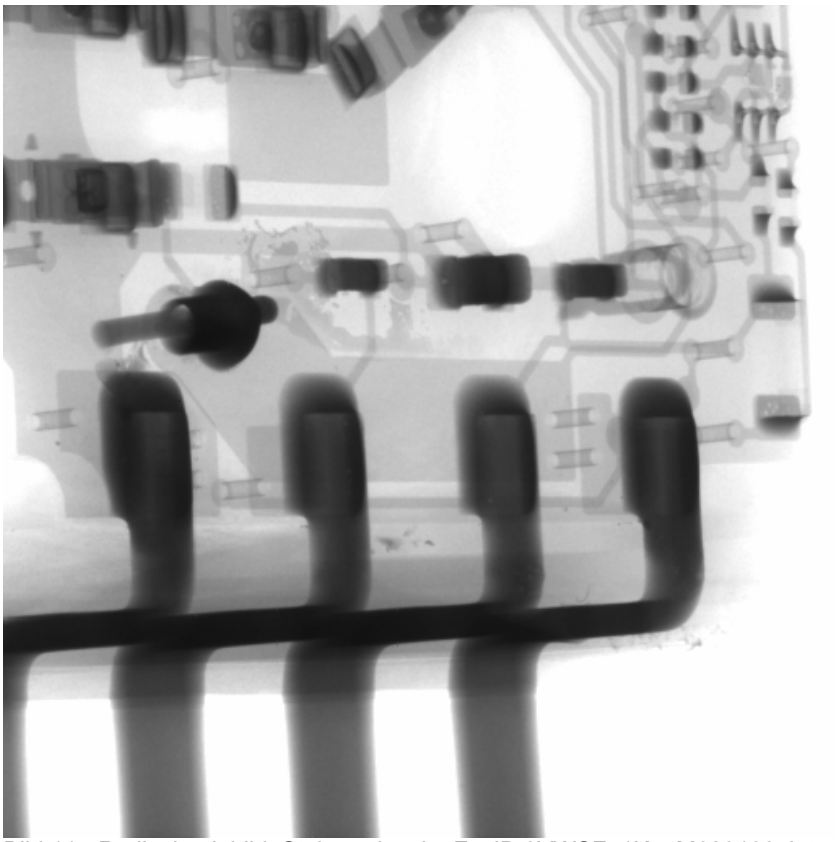


Bild 11: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA, Auffälligkeiten im Bereich des Kondensators

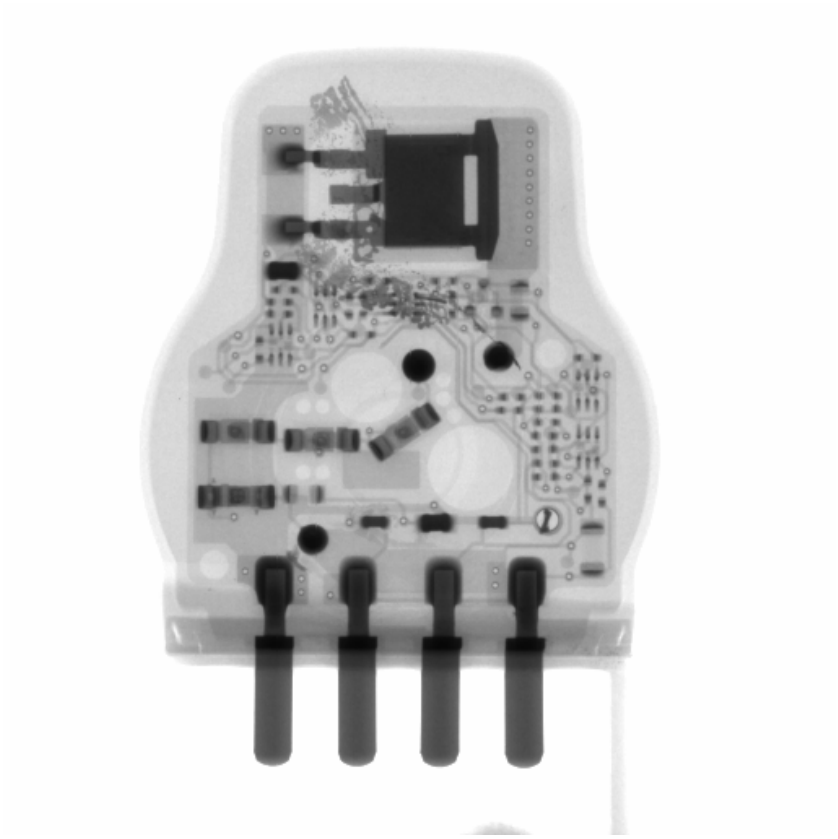


Bild 12: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA

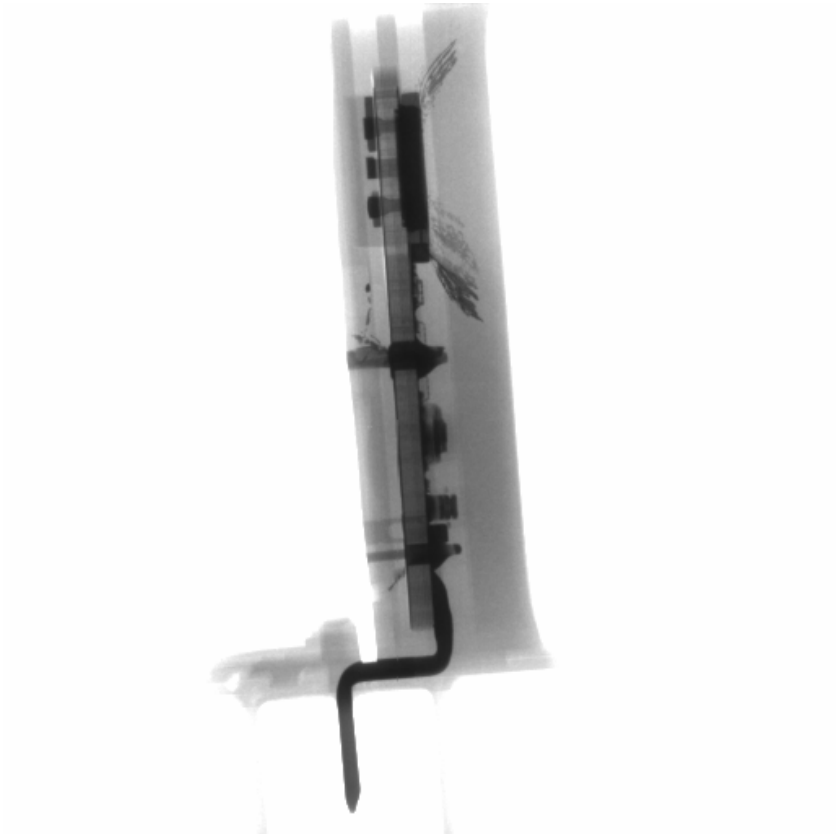


Bild 13: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA

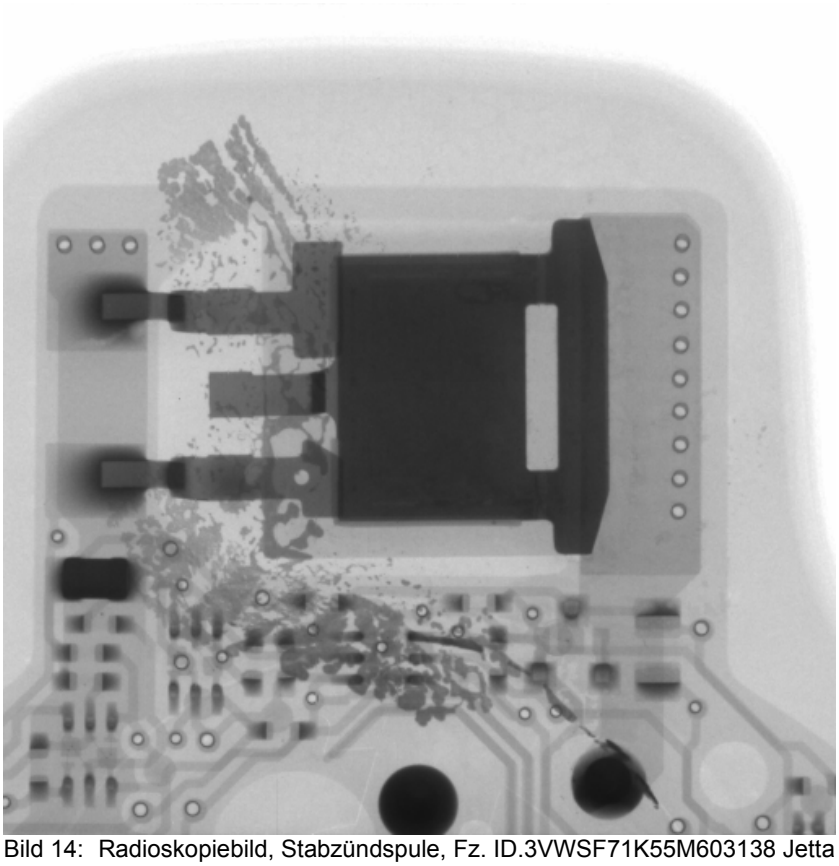


Bild 14: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA

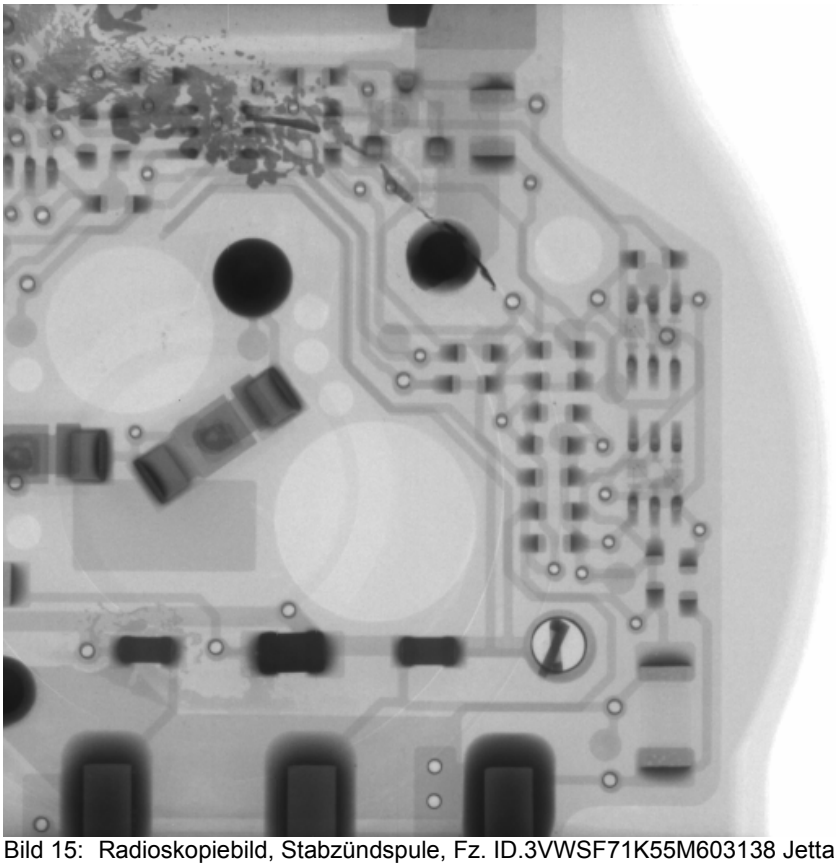


Bild 15: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA

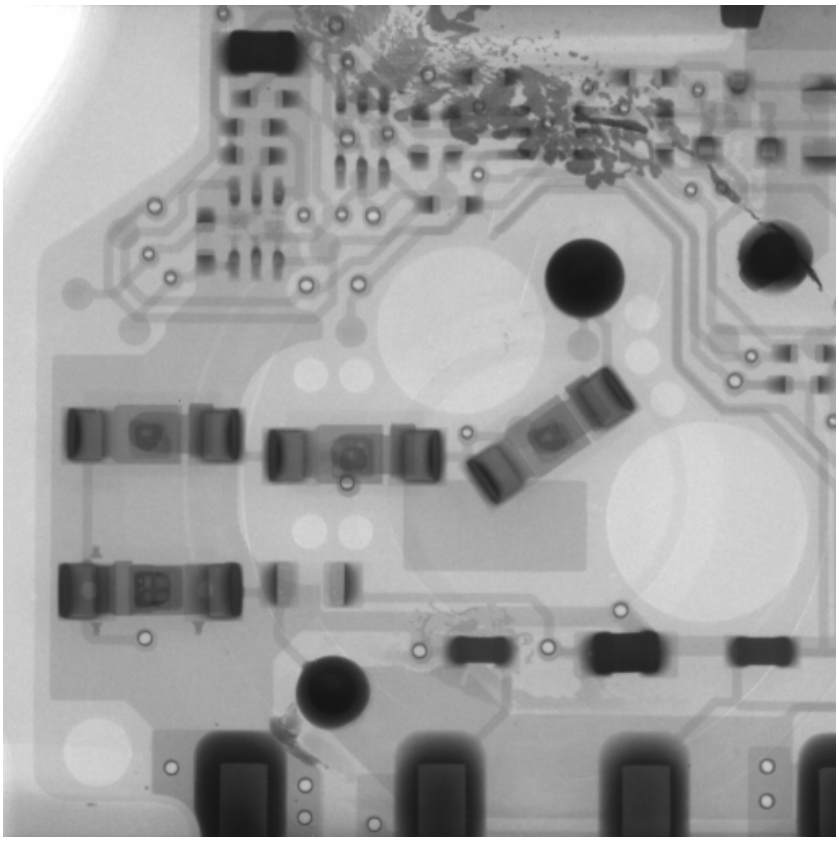


Bild 16: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA

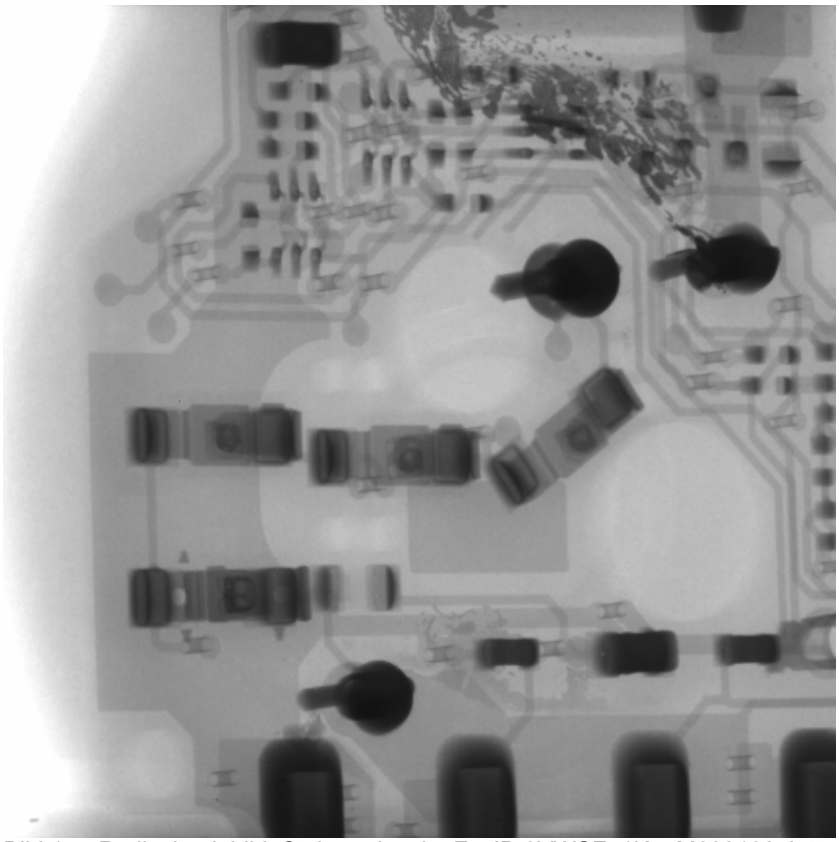


Bild 17: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA

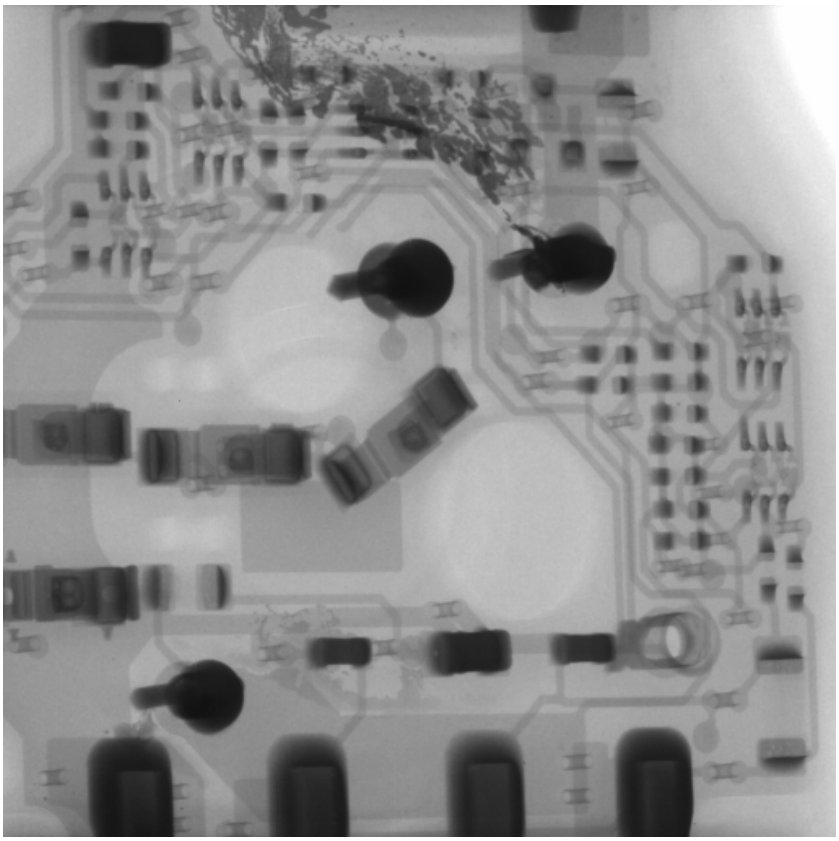


Bild 18: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA

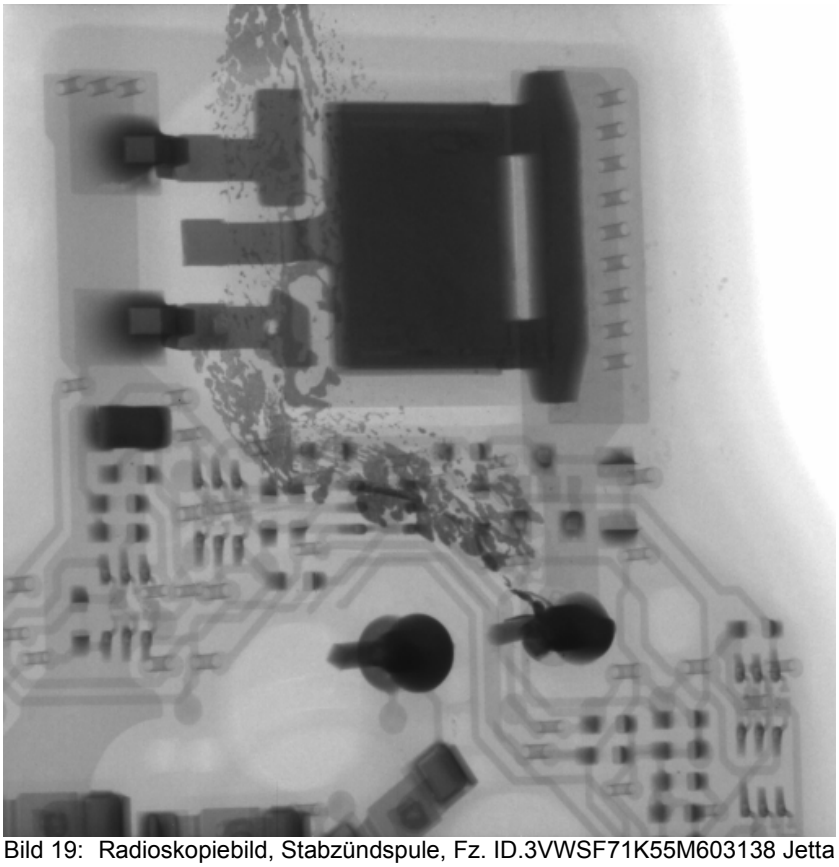


Bild 19: Radioskopiebild, Stabzündspule, Fz. ID.3VWSF71K55M603138 Jetta USA

4 Durchführung

Die Untersuchung wurde an der Mikrofokus-Computertomographie-Anlage (DP425) der Fa. Seifert durchgeführt. Alle angelieferten Bauteile wurden radioskopiert und tomographiert und schichtweise aus drei orthogonalen Ansichten beurteilt. Die Einzelergebnisse und Maschinenparameter können bei K-QS-32 eingesehen werden.

1 Task
Radioscopy and CT
Please examine the separated ignition coil electronics for possible short circuit traces or causes.
Damage: ignition coil overheats and is stretched, head is crooked.
Vehicle ID.3VWSF71K55M603138 Jetta USA

2 Summary / 3 Individual results
The delivered ignition coil was radioscopied and tomographied in the presence of the client.

Results of the CT/radioscopy investigation:

- The IGBT has failed.
- A ceramic condenser shows irregularities in the area of the solder post.

The results are documented in images 1 to 19.

The client was informed in advance on 14.04.05. The component was given back to the client for further investigations.

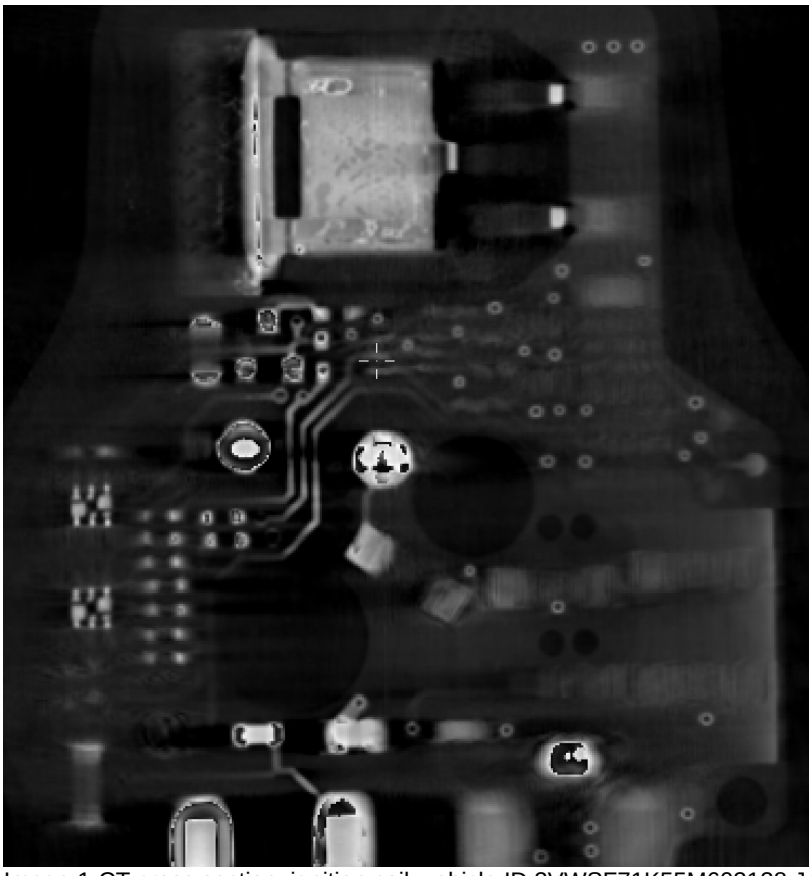


Image 1:CT cross section, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA, failed IGBT

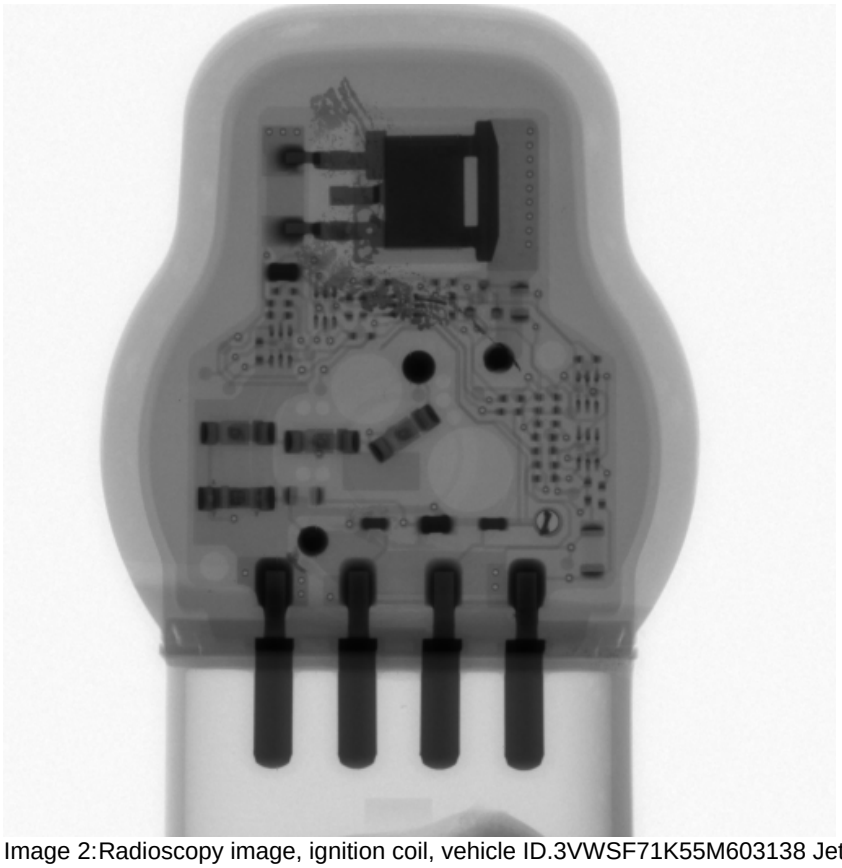


Image 2: Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA

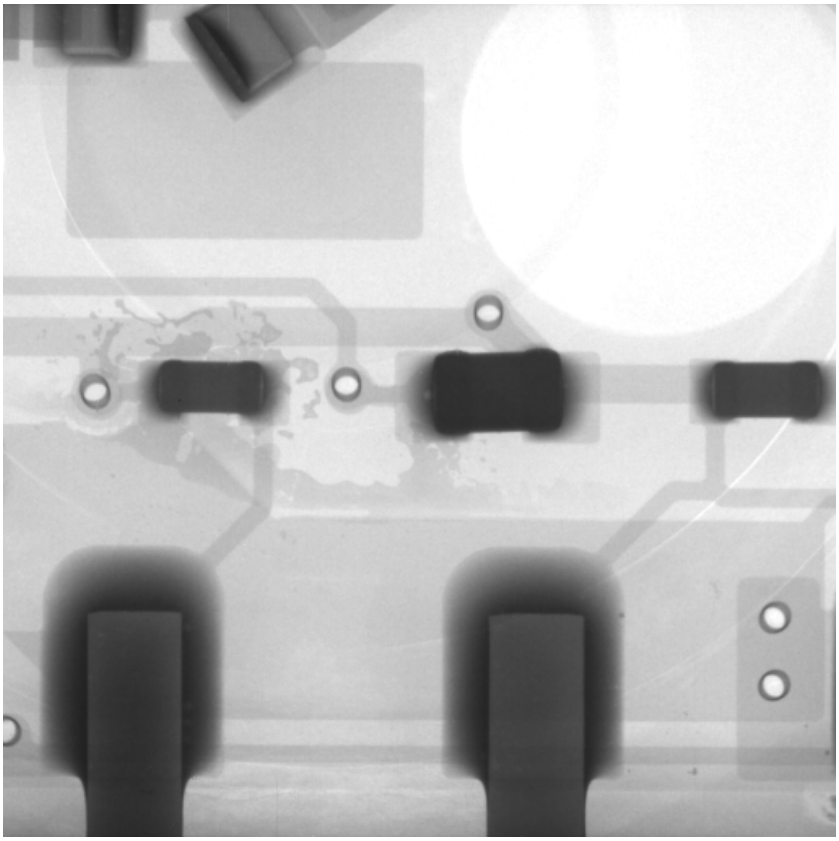


Image 3: Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA, irregularities in the area of the condenser

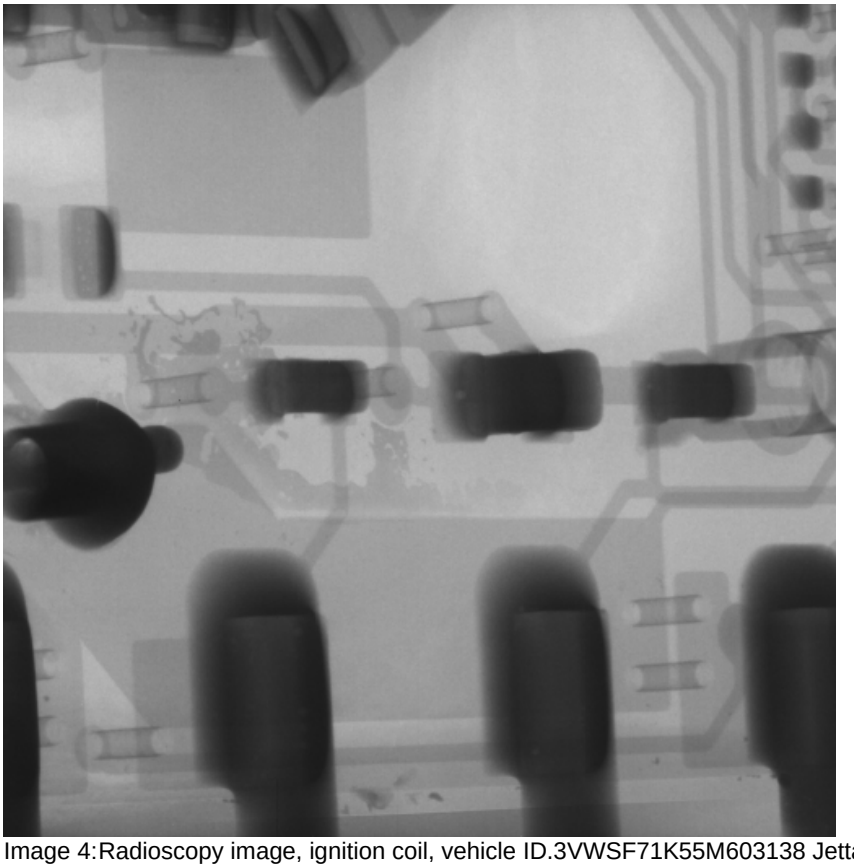


Image 4: Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA, irregularities in the area of the condenser

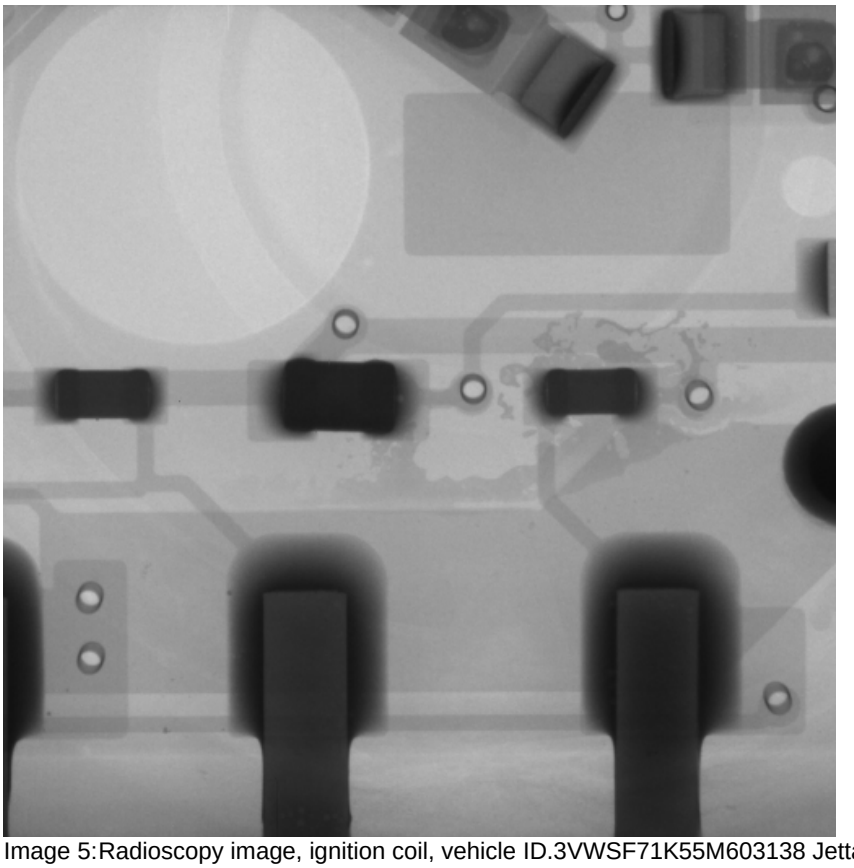


Image 5: Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA, irregularities in the area of the condenser

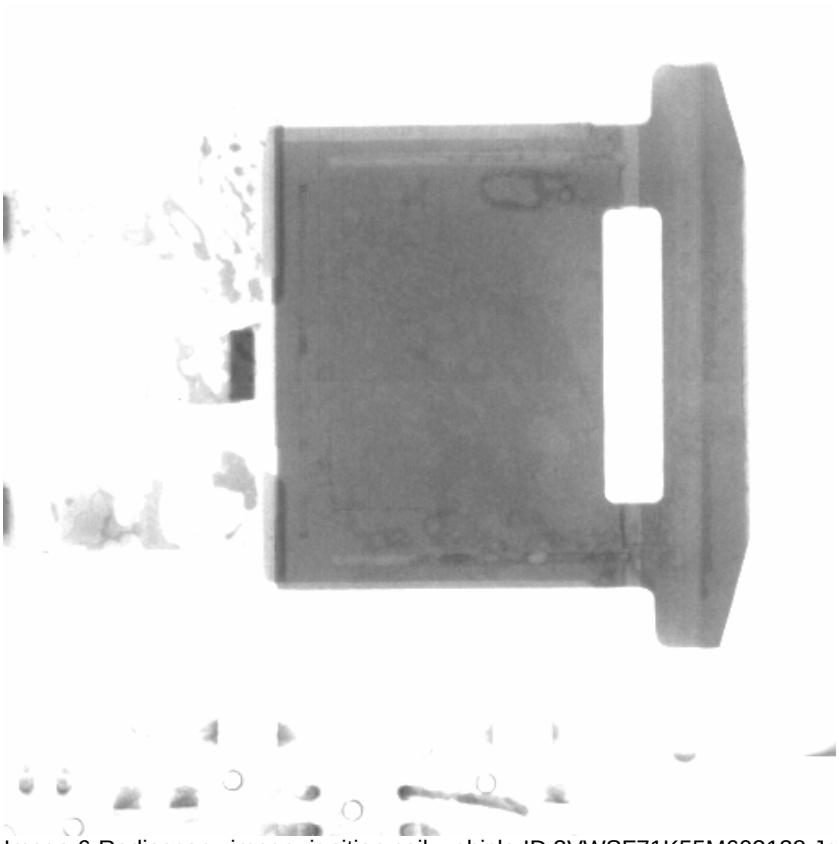


Image 6:Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA, failed IGBT

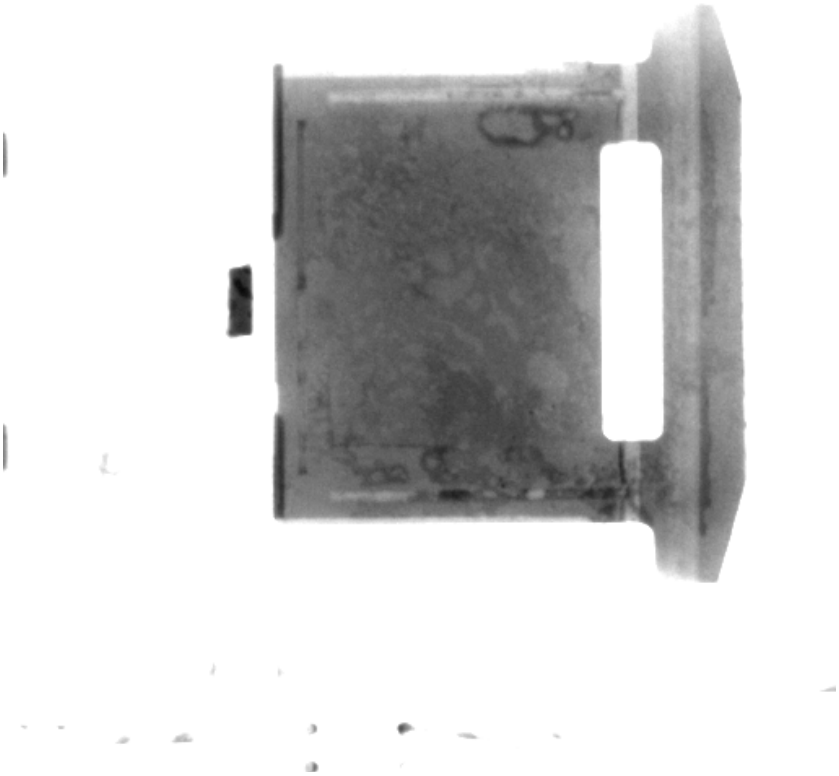


Image 7:Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA, failed IGBT

Image 8:Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA,

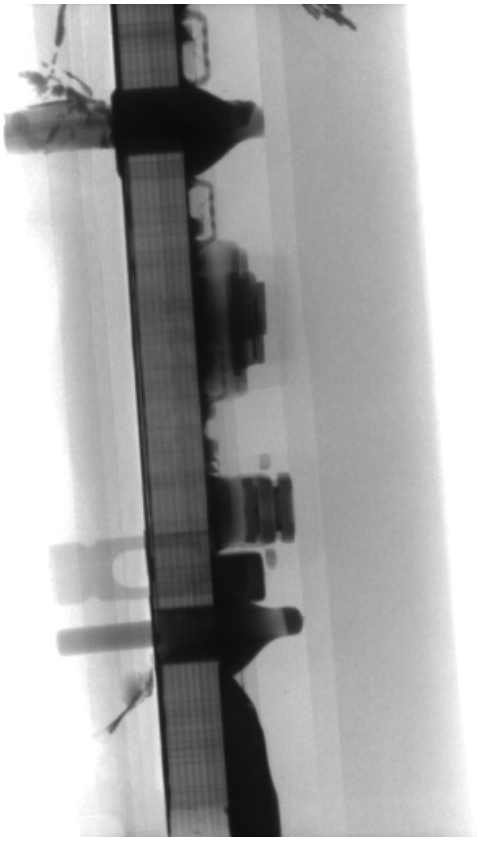


Image 9:Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA,

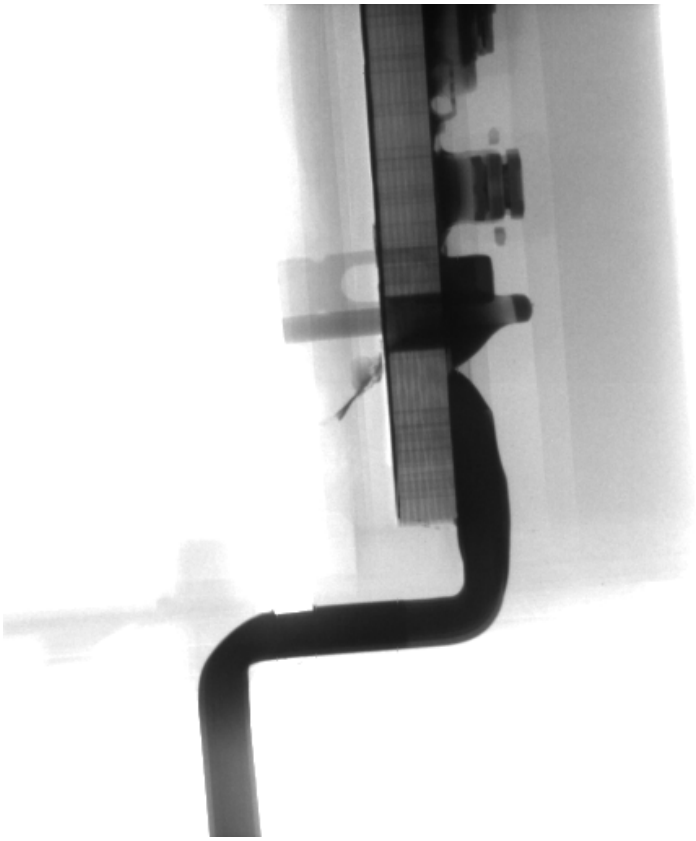


Image 10: Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA,

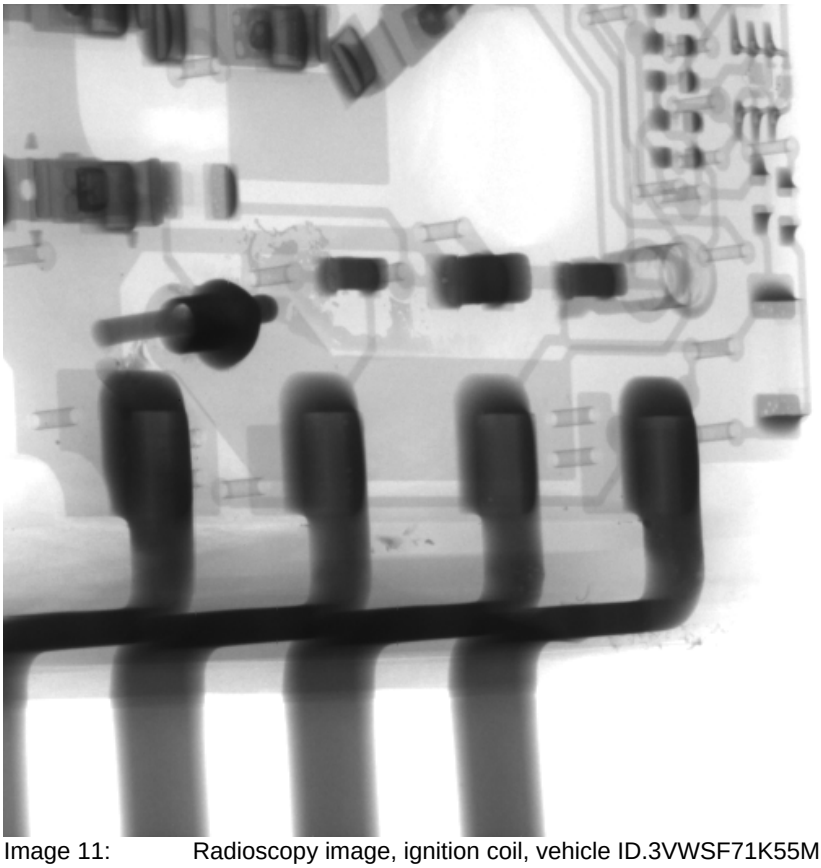


Image 11: Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA, irregularities in the area of the condenser

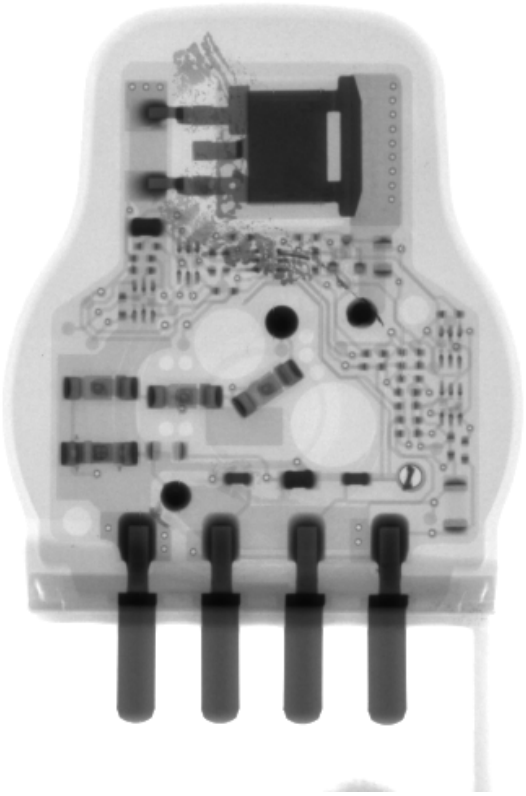


Image 12: Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA

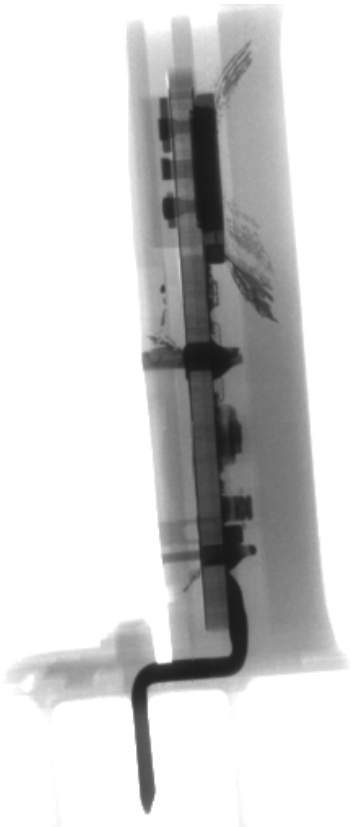


Image 13: Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA

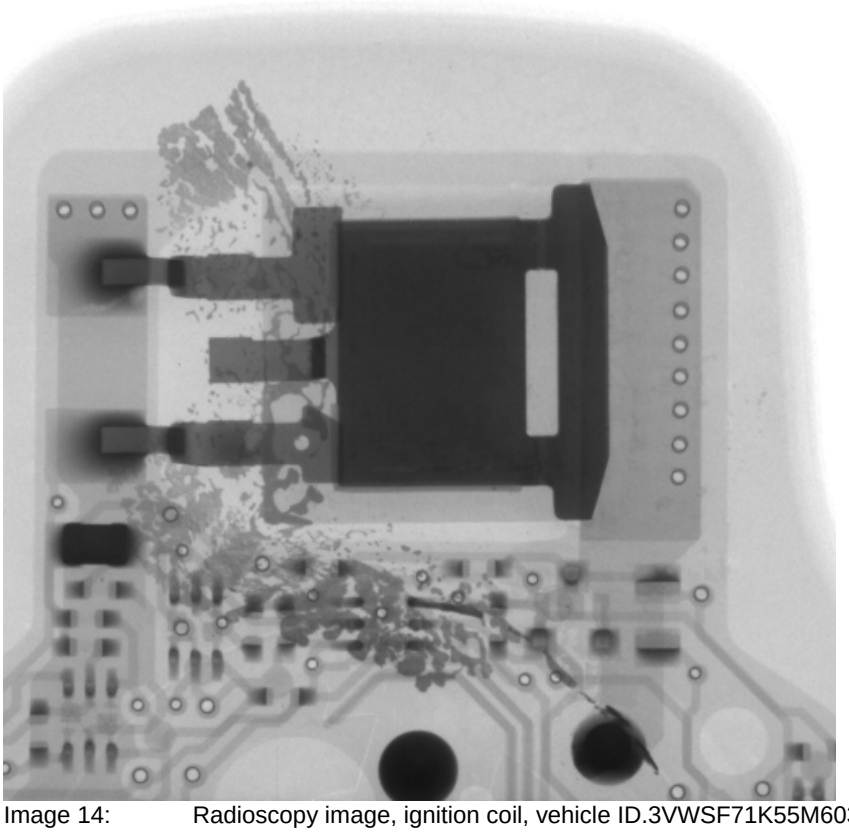


Image 14: Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA

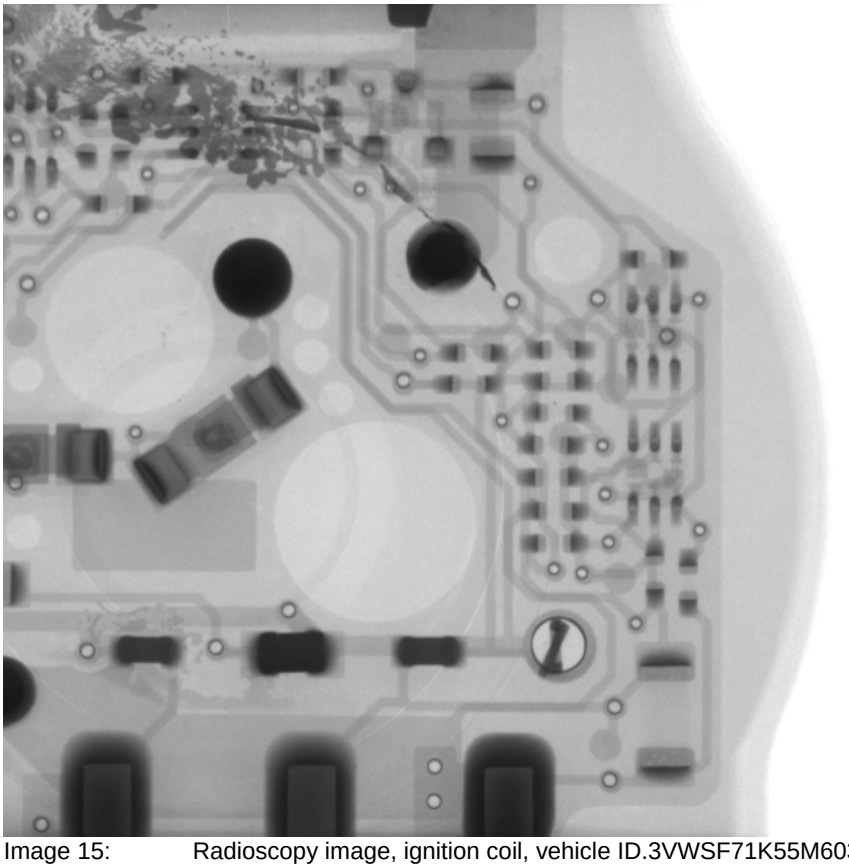


Image 15: Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA

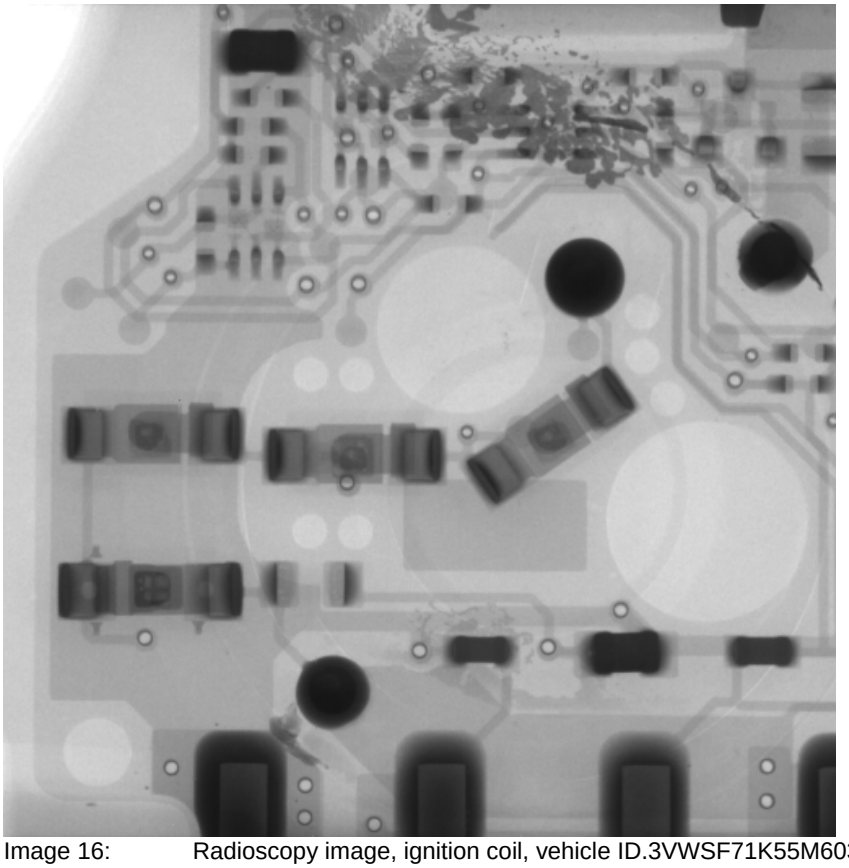


Image 16: Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA

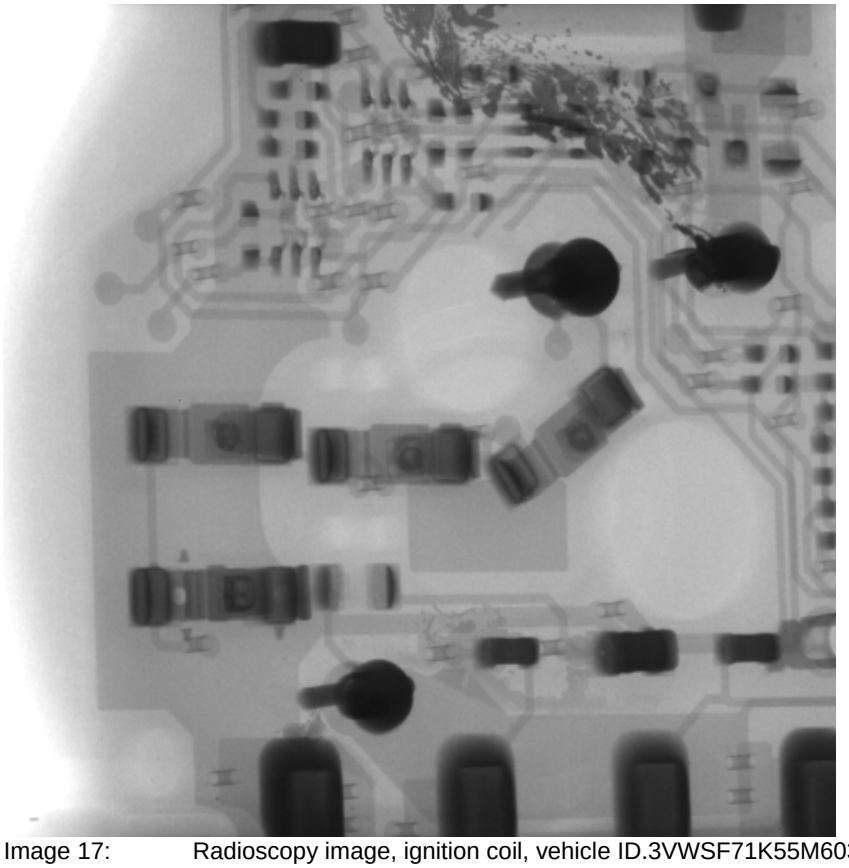


Image 17: Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA

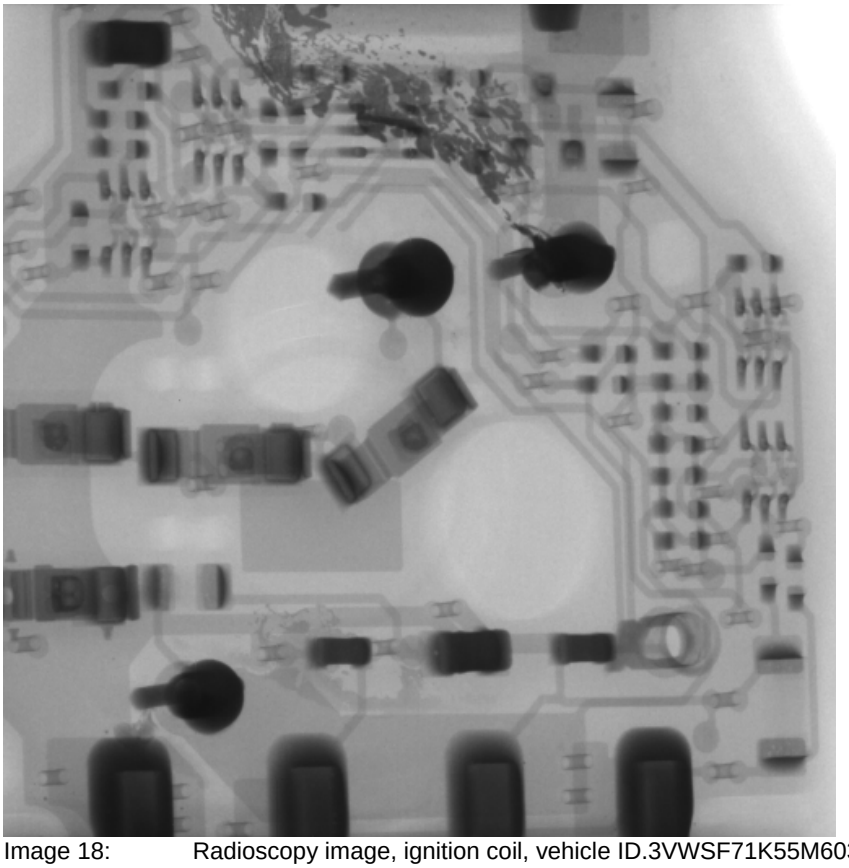


Image 18: Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA

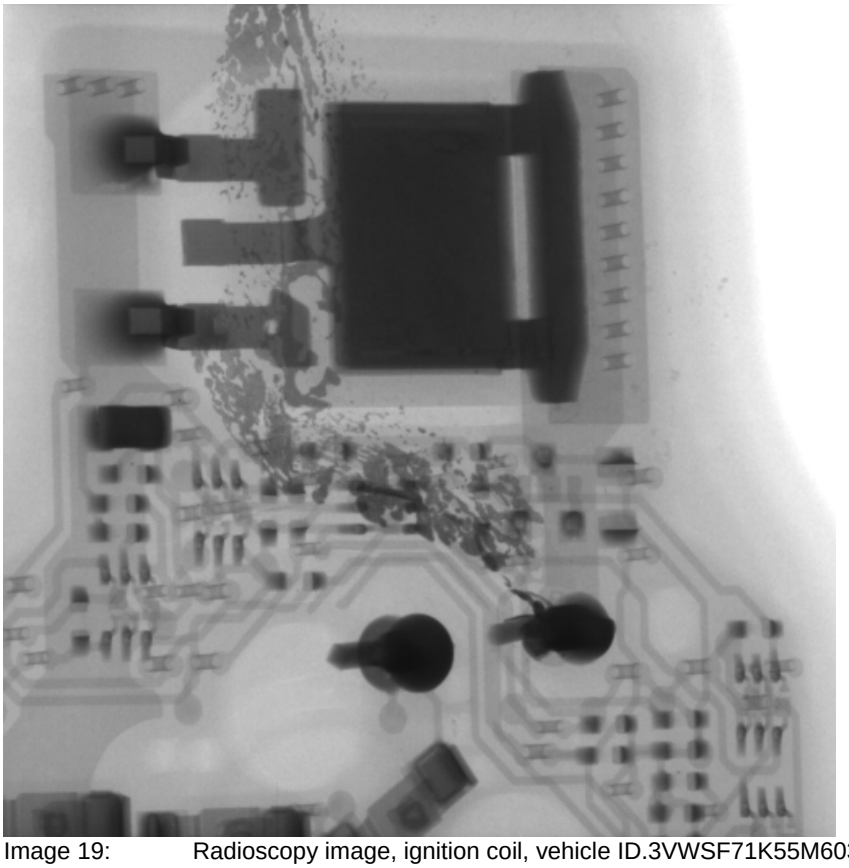


Image 19: Radioscopy image, ignition coil, vehicle ID.3VWSF71K55M603138 Jetta USA

4 Implementation

The investigation was carried out using the Seifert microfocus computer tomography system (DP425). All delivered components were radioscopied and tomographied and assessed in layers from three orthogonal views. The individual results and machine parameters can be viewed in K-QS-32.

era PowerTrain	8D-Report		Berichts-Nr. : MPV05-018
Verteiler :	**Audi :** Hr. Bodor, Hr. Wéber, Hr. Hora **VW:** Hr. Held, Dr. Bennewitz, Hr. Fricke, Hr. Giere **Skoda:** Hr. Kovarik **era :** Dr.Senftleben, Hr.Teegler, Hr. Fischer, Hr. Gau, Hr. Berghaus, Hr. Laube		**Datum :** 25.04.2005
Erzeugnis :	Stabspule VW/Audi	**era-Nr. :** 11981ESM	**Eing.datum :** s. Übersicht
Herstellungsdatum :	s. Übersicht	**Kunden-Nr. :** 022 905 100	
Kundendaten :	**Beanstandungstitel :**	Feldrückläufer	**lfd. era-Nr. :** 6392, 6403
	SAB-Nr. :	s. Übersicht	
	Motor- / Fahrgest. Nr. :	s. Übersicht	**Fehlercode :** 1F

1. Team :	Dr.Senftleben, Hr.Teegler,Hr. Fischer, Hr. Hartmann, Hr. Renz	**Beanstandung ist relevant für :**		**Reklamation**
Abt. :	era PowerTrain-QS			
Teamleiter :	Dr.Senftleben	**Prozess-FMEA :**	☐	**anerkannt** ☒ x
Telefon :	02354 / 777-165	**Konstruktions-FMEA :**	☐	**abgewiesen** ☐
Mail :	h.senftleben@era.de	**Es liegt kein era-Fehler vor :**	☐	**offen** ☐

2. Beanstandungsgrund :

Beanstandungsmenge :	2	**Wiederholfehler :**	**ja :** ☒ x	**nein :** ☐	
Geprüfte Stückzahl :	2				
Fehlerhafte Stückzahl :	2				

3. Fehlerursache : Wickelfehler in der Primärspule, Außendurchmesser der Wicklung zu groß, dadurch Kurzschluss zum Außenblech

4. Sofortmaßnahmen : Keine

Einführungstermin : **Wirksam ab FD :**

5. Langfristige Maßnahmen : Optimierte Wickelprogramm, das die tatsächliche Toleranzlage des Drahtdurchmessers berücksichtigt und automatisierte 100% Prüfung des Wicklungs-Außendurchmessers.

Einführungstermin : 28.05.2004 bei era Elektrotechnik **Wirksam ab FD :** KW 25/04

6. Nachweis der Wirksamkeit der Maßnahmen : Kein Ausfall seit Einführung der Maßnahmen, kein Ausschuss bei der 100% Prüfung.

7. Maßnahmen zur Vermeidung von Wiederholfehlern : siehe 5.

Erstellt durch :	A.Theile	**Tel. :**	02354-777-158	**Datum :**	25.04.2005
		Mail. :	a.theile@era.de		

lfd. Nr.	Eingangs-datum	SAB-Nr. (VW)	Motornr.	Fahrgestellnr.	Bremi-Nr.	Kunden-Nr.	Ind	L	FD T-Code	FD Tag	FD KW	FD Jahr	F- Code	F- Ind.
6392	02.09.2004	11-2004.08.26-f-006	AYTxxxxxx	3DZ38003325	11981esm	022905100	E	L2	xxxx	II / 5	10	2003	1	F
6403	01.09.2004	12-2004.08.18-f-007	3,2 ltr. 162kW BAA	7l4d000411	11981esm	022905100	E	L2	xxxx	III / 2	50	2002	1	F

era PowerTrain	8D-Report		Report No. : MPV05-018
Distribution list:	**Audi :** Mr Bodor, Mr Wéber, Mr Hora **VW:** Mr Held, Dr Bennewitz, Mr Fricke, Mr Giere **Skoda:** Mr Kovarik **era :** Dr Senftleben, Mr Teegler, Mr Fischer, Mr Gau, Mr Berghaus, Mr Laube		**Date :** 25.04.2005
Product :	Ignition coil VW/Audi	**era No. :** 11981ESM	**Received:** s. overview
Manufacturing date :	s. overview	**Customer No. :** 022 905 100	
Customer data :	**Complaint:** field return **SAB No. :** s. overview **Engine / Chassis No. :** s. overview		**era No. :** 6392, 6403 **Fault entry :** 1F

1. Team :	Dr Senftleben, Mr Teegler, Mr Fischer, Mr Hartmann, Mr. Renz	**Complaint is relevant for:**		**complaint**	
Dept. :	era PowerTrain QS				
Team leader:	Dr Senftleben	**Process FMEA :**	☐	**recognised**	x
Tel:	02354 / 777-165	**Construction FMEA :**	☐	**rejected**	☐
E-mail :	h.senftleben@era.de	**There is no era fault:**	☐	**open**	☐

2. Reason for complaint:

Number of complaints:	2	**Repeat faults:**	**yes :**	x	**no :** ☐
Checked amount:	2				
Faulty amount:	2				

3. Cause of the fault: Winding fault in the primary coil, outer diameter of winding too big, this leads to short circuit to the outer plate

4. Immediate measures: None

Introduction date: **Effective from FD:**

5. Long-term measures: Optimised winding which considers the actual tolerances of the wire diameter and automated 100% check of the outer winding diameter.

Introduction date: 28.05.2004 at era Elektrotechnik **Effective from FD:** Week 25/04

6. Proof of the effectiveness of the measures: No failure since introduction of measures, no rejects with 100% check.

7. Measures to avoid repeat faults: see 5.

Created by: A.Theile **Tel. :** 02354-777-158 **Date :** 25.04.2005
E-mail : a.theile@era.de

No.	Date received	SAB No. (VW)	Engine No.	Chassis No.	Bremi No.	Customer No.	Ind	L	FD T-code	FD day	FD week	FD year	F code	F Ind.
6392	02.09.2004	11-2004.08.26-f-006	AYTxxxxxx	3DZ38003325	11981esm	022905100	E	L2	xxxx	II / 5	10	2003	1	F
6403	01.09.2004	12-2004.08.18-f-007	3.2 l 162kW BAA	7l4d000411	11981esm	022905100	E	L2	xxxx	III / 2	50	2002	1	F

Fairchild Semiconductor

8D Corrective Action Report

Device: HGT1S20N36G3VLS_SB82038A PQA Number: 2005180058

Working 8D

Date: 27. April 2005 **Author: Dan Copertino**

Customer Information:

Name: ELDOR
Location: ITALY

Contacts	Name	Phone	Fax

Part Number:

Reference Documents:

Reference Type	Reference Number
	21-2005-04-08-f-001
	26-2005-04-12-p-001

Summary/Abstract:

Eldor returned 2 devices for analysis due to coil failures in the field.

Ref# Audi 21-2005-04-08-f-001
The device was tested for static parameters at room temperature and met published specifications. This device is considered an unconfirmed failure. It is possible that some other component on the PCB of the coil itself failed resulting in the defective coil.

Ref# VW 26-2005-04-12-p-001
The device was analyzed and electrical damage was noted in the ring structure of the device. Carbonized epoxy was noted throughout the ring area suggesting long durations of current flow in the voltage isolation rings. The rings sustained permanent damage in the upper left corner of the die, with some of the active area suffering from prolonged heating effects. The nature of the damage observed on the die surface is indicative of an excessive voltage related overstress. This type of failure could have been the result of a high voltage arcing episode.

Team Members:

Copertino, Dan	570-474-3721	Primary contact for this file
Platko, George	570 474 3239	
Novosel, Mike	570-474-6761	
Reinkensmeier, Stefan	+49-8141-6102-108	CQE
Wolfgang, Doser	49 8141 6102 113	

Problem Description:

Device Info:	Package	Leads	Stampoff	ROM Code
	TO263	002		

Technology: DISCRETE IGBT (
Process: (EXCLUDING IGNI
Division: Fairchild
Product Group:
Accounting Group: IGBT Ignition

Datecode	Die Run	Quantity	Top marking
04XX	XX	1	NONE

Reported Fail Status: Line/Prod
Reported Fail Temperature:
Reported Test Condition:

Containment Actions:

None

Define Root Cause:

Findings During This Analysis:

Top Marking	Serial Number	Description
NONE		Other
NONE		MELTED, EVAPORATED, OR FUSED METAL, EOS

Process name:	Initial Verification
Person responsible:	Copertino, Dan
Step initiated date:	27 Apr 2005
Step comp letion date:	27 Apr 2005
ATE Verification:	The samples were mechanically ground to expose the leads on the devices. Test wires were soldered to the leads and the devices were tested on a Tektronix 370A curve tracer. The device from Box 1 passed initial testing while the device from Box 2 was short.
External Visual:	Visual inspection revealed the devices were encapsulated in an epoxy compound for a coil on plug application.

Process name: Failure Analysis 1
Person responsible: Copertino, Dan
Step initiated date: 27 Apr 2005
Step completion date: 27 Apr 2005
Results Comments: Ref# Audi 21-2005-04-08-f-001

The device was tested on a curve tracer for all static parameters at room temperature and was found to be within specifications (See table #1). The remaining portions of epoxy were ground to expose the device. The date code was attempted to be recovered by sonoscan but was not successful. Leadframe characteristics of the device indicate it was packaged at ChipPAC.

Ref# VW 26-2005-04-12-p-001

The remaining portions of epoxy were ground to expose the device. The date code was attempted to be recovered by sonoscan but was not successful. Leadframe characteristics of the device indicate it was packaged at Cebu.

The device was then decapsulated in a jet etch machine. Visual inspection revealed large amounts of carbonized epoxy remaining on the die. Bond wires were partially exposed and found to be intact with no open contacts observed. The remaining epoxy was removed by a second etch and the device was inspected again. The top surface of the die showed signs of excessive heating. The protective nitride on the surface was damaged primarily in the upper left corner of the die. Electrical damage was noted in the ring structure in the upper left hand corner. The entire isolation ring structure contained carbonized mold compound. This is an indication that the device suffered from a possible high voltage event for an extended period.

The device was hotspotted utilizing liquid crystal. During this procedure it was noted that the breakdown voltage partially recovered from being short to blocking 150 volts. Hotspot indicated current flow through the midpoint of the diode bank which indicated the outer two rings were still shorted. Decapsulation processes and subsequent cleaning most likely removed some of the material shorting the rest of the ring structure.

Process name: Root Cause Analysis
Person responsible: Copertino, Dan
Step initiated date: 27 Apr 2005
Step completion date: 27 Apr 2005
Results Comments: Ref# Audi 21-2005-04-08-f-001

The device was tested for static parameters at room temperature and met published specifications. This device is considered an unconfirmed failure. It is possible that some other component on the PCB of the coil itself failed resulting in the defective coil.

IGES	IGESR	Vth	BVCES	ICES	IECS
10V	10V	1mA	10mA	250V	24V
754uA	750uA	1.55V	365V	.7uA	66uA
BVECS	BVGES	BVGESR	VCEsat1	VCEsat2	
10mA	2mA	2mA	10A@4.5Vge	20A@5Vge	
36.75	14.2V	14.3V	1.272V	1.612V	

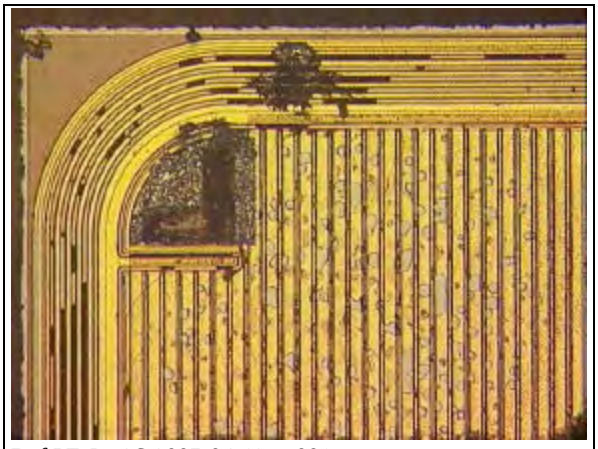
Ref# VW 26-2005-04-12-p-001

Analysis of this device revealed signs of electrical and over heating damage primarily in the ring structure of the device. The nature of this damage is indicative of an overvoltage event, possibly an arcing across the ring structure. Once the initial damage occurred, current was allowed to flow and resulted in the overheating damage noted.

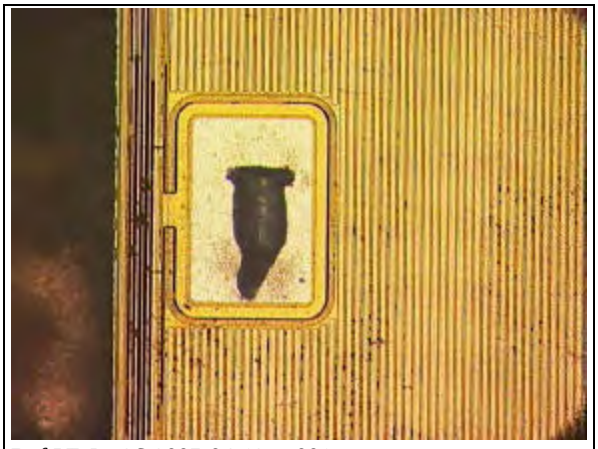
Ref Audi - # 21-2005-04-08-f-001
Portion of module as received.

Ref VW -# 26-2005-04-12-p-001
Portion of module as received.

Image of leadframe from both devices after mechanical grind. Device on left is ChipPAC's leadframe while the device on the right is from Cebu.



Ref VW – 26-2005-04-12-p-001
Electrical damage noted in the ring structure. Upper left corner of the die. Entire ring area appeared to get hot for extended period as evident by carbonized epoxy left in the ring area after decap



Ref VW – 26-2005-04-12-p-001
Figure 2: Ring area near gate pad showing continued carbonized epoxy left in the ring area after decap. Note black lines in rings and around gate pad, this is carbonized epoxy.

Verify Corrective Actions:

NA

Implement Corrective Actions:

NA

Prevent Recurrence:

These EOS failures have been referred to our Test and Fabrication Engineering groups for their tracking and continued review. At the same time, we request the customer investigate their application for possible sources of an EOS event. If necessary, the Fairchild Field Application/Service Engineer may be requested via the local Fairchild Sales Office to assist in the investigation.

Closure:

.

Audi
Quality assurance

Test Report FIELD

Complaint number	*Entry date*	*Factory*	*Complaint location*
0002019864	31.03.2005	22	USA

Damage part 06B 905 115 N Ignition coil

Delivered part 06B 905 115 N Ignition coil

Supplier 00001542 00 PULSE POWERTRAIN GMBH & CO. KG MEINERZHAGEN
AM ROTTLAND 12 58540 MEINERZHAGEN,GERMANY

FSN	*Dept.*	*Telephone*

Parts manager

Damage assessor

SAGA code

Make	*Prod. daught.*	*ISO*	*DC*	*Partner*	*Task no.*	*Serial no. application date*
A	0200	USA	444	01E53	48921B	A0

VIN	*Replacement part*	*Damage type BD*
WA1YD64B85N010740	06B 905 115 N	0040 0

Vehicle type	*Km reading*	*Delivery date*	*Repair date*	*Control data*
4BH57Z	6.000	21.10.2004	21.01.2005	110

Service no. 2820 ignition coil ***Type of damage*** 0040

No. of complaint items	*No. of work items*	*Part manufacture date*	*Comment*
1,00	1,00	28.09.2004	

Complaint text

Complaint code	*Complaint code text*
SA040	Electrical fault

Fault code	*Fault code text*
MM032	Function test okay /corrosion visible on component

Originator	*Comment*	*From VIN*
AUDI	P0300 P0301 P0302	

QTS status	*Delivery status*	*Completion indicator*	*In usage date*
2 29.04.2005	29.04.2005		

Test report no.	*Costs to be borne by*	*No. of cost items*
	AUDI 21 6506	1,00

Cause/Action

Audi
Quality assurance

Test Report FIELD

Complaint number	*Entry date*	*Factory*	*Complaint location*
0002031033	13.04.2005	22	USA

Damage part 06B 905 115 N Ignition coil

Delivered part 06B 905 115 N Ignition coil

Supplier 00001542 00 PULSE POWERTRAIN GMBH & CO. KG MEINERZHAGEN
AM ROTTLAND 12 58540 MEINERZHAGEN,GERMANY

FSN *Dept.* *Telephone*

Parts manager

Damage assessor

SAGA code

Make	*Prod. daught.*	*ISO*	*DC*	*Partner*	*Task no.*	*Serial no. application date*
A	0200	USA	444	01E53	49722A	**

VIN	*Replacement part*	*Damage type BD*
WA1YD64B85N010740	06B 905 115 N	

Vehicle type	*Km reading*	*Delivery date*	*Repair date*	*Control data*
4BH57Z 0				

Service no. 2820 ignition coil *Type of damage*

No. of complaint items	*No. of work items*	*Part manufacture date*	*Comment*
1,00	1,00	28.09.2004	

Complaint text

Complaint code *Complaint code text*

Fault code *Fault code text*
MM032 Function test okay /corrosion visible on component

Originator *Comment* *From VIN*
AUDI P0421 P0300 P0302

QTS status	*Delivery status*	*Completion indicator*	*In usage date*
2 29.04.2005	29.04.2005		

Test report no.	*Costs to be borne by*	*No. of cost items*
	AUDI 21 6506	1,00

Cause/Action
Wrong lubricant Györ

Aufgabenstellung
Fehleranalyse von sieben Stabzündspulen aus den USA-Markt.

2 Zusammenfassung
„“.

3 Einzelergebnisse

11-2005.04.28-f-008

- Teile-Nummer: 022 905 100A L2 B1F5 6 11/04 Fa. Bremi
- FZG-Nr.: WVGBC77L44D071365
- das Material vom Primärspulenkörper wurde durch Temperatureinwirkung plastisch verformt (Abbildung 1).
- der IGBT ist beschädigt. Nach dem Austrennen wurde festgestellt, dass der IGBT-Körper sehr stark angeschmort ist (Abbildung 5).

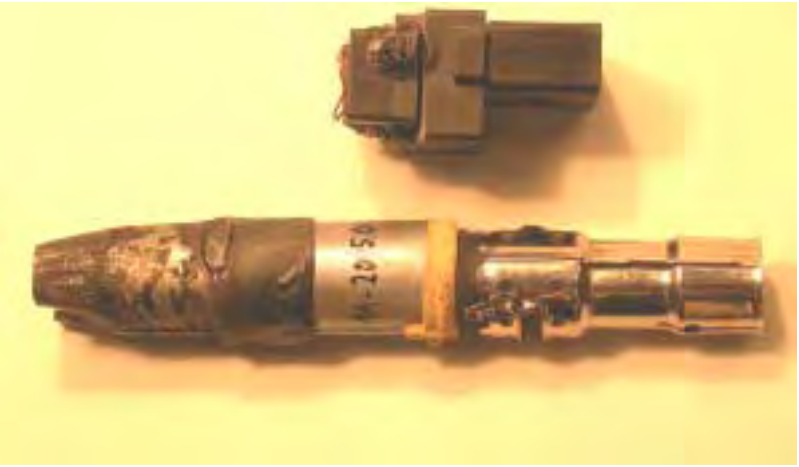


Abbildung 1: Spulen Ansicht

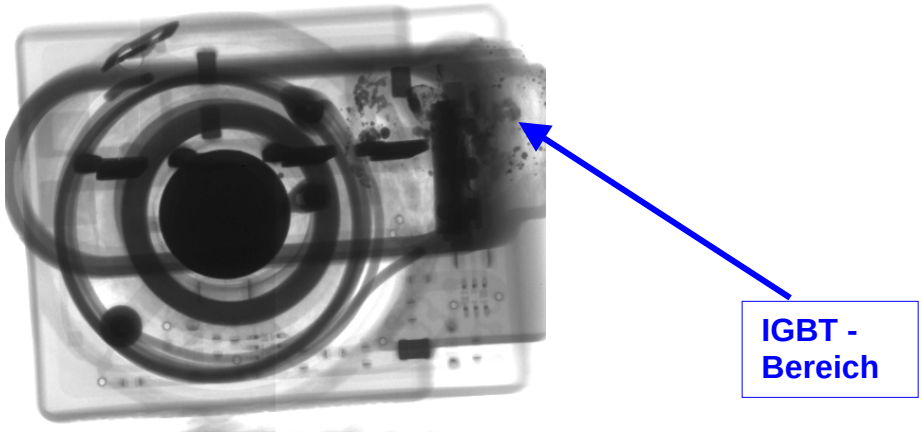


Abbildung 2: Radioskopische Untersuchung, Draufsicht

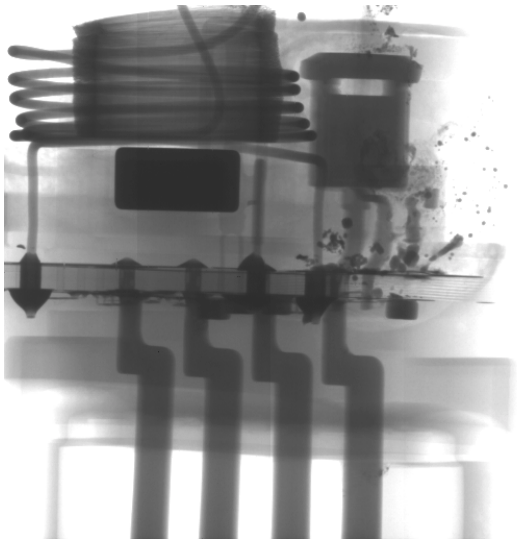


Abbildung 3: Radioskopische Untersuchung, Seitenansicht

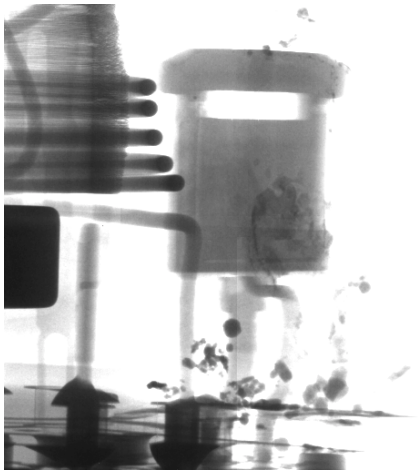


Abbildung 4: Radioskopische Untersuchung, IGBT Ansicht

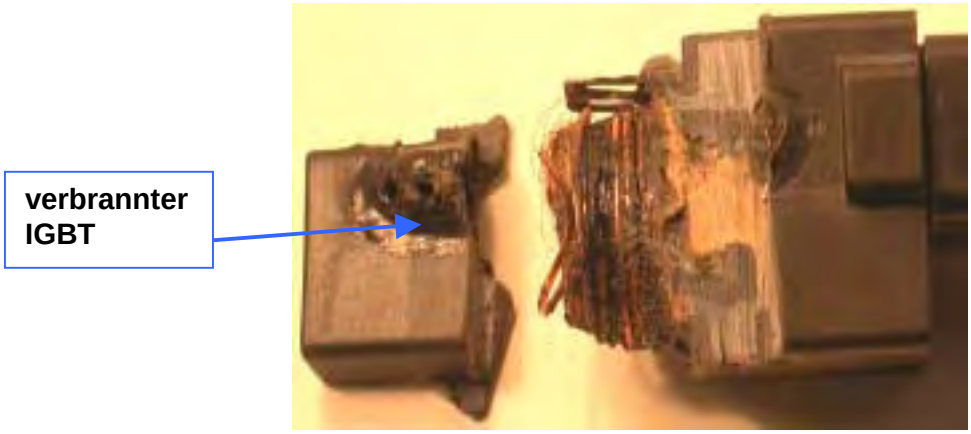


Abbildung 5: IGBT Ansicht

11-2005.04.28-f-015

- Teile-Nummer: 022 905 100A L2 5397 4 15/04 Fa. Bremi
- FZG-Nr: WVGZG77L25D020581
- das Material vom Spulenkörper wurde im Bereich der Platine durch Temperatureinwirkung plastisch verformt und ist verschmort (Abbildung 6).
- Nach dem Austrennen und Vermessen wurde festgestellt, dass der IGBT durchlegiert ist.

Abbildung 6: Spulen Ansicht

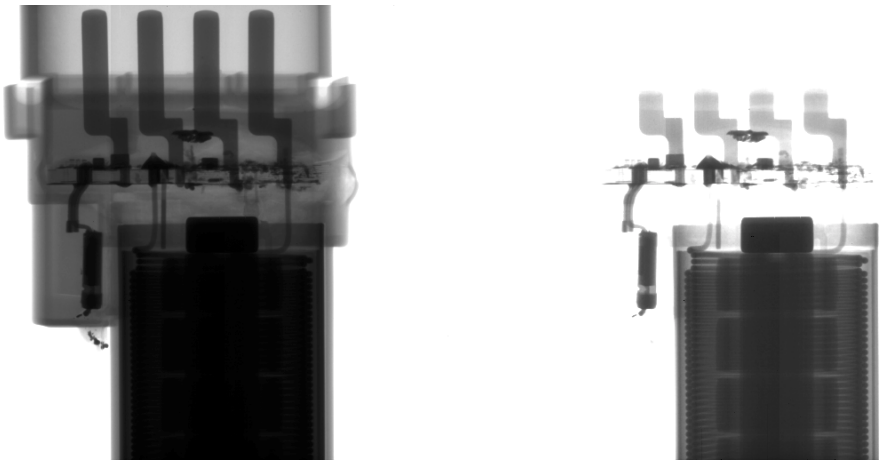


Abbildung 7: Radioskopische Untersuchung, Seitenansicht

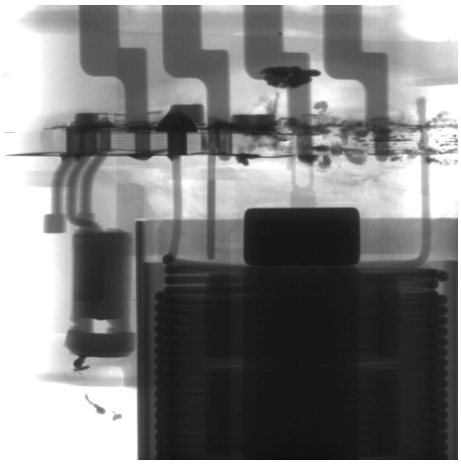


Abbildung 8: Radioskopische Untersuchung, Seitenansicht

11-2005.04.28-f-013

- Teile-Nummer 06B 905 115L L1 0A8F 4 01/04 Fa. Bremi
- FZG-Nr: WVWPD63B24E239903
- das Material vom Primärspulenkörper wurde durch Temperatureinwirkung plastisch verformt , die Vergussmasse über dem IGBT ist stark verschmort (Abbildung 9).

.

Abbildung 9: Spulen Ansicht

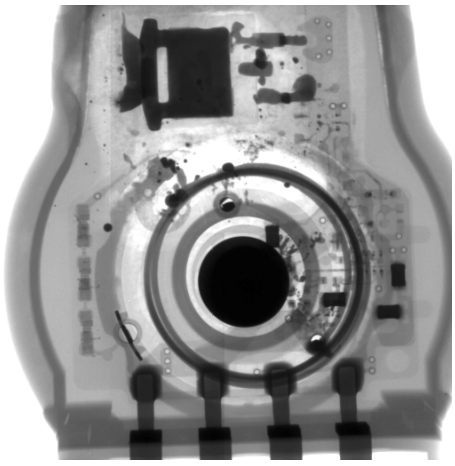


Abbildung 10: Radioskopische Untersuchung, Draufsicht

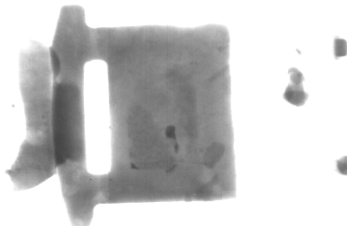


Abbildung 11: Radioskopische Untersuchung, IGBT Ansicht

11-2005.04.28-f-012

- Teile-Nummer: 06B 905 115 L L1 N93C 6 48/03 Fa. Bremi
- FZG-Nr: WVWPD63B24E239903
- Die Vergussmasse über der Ansteuerplatine hat einen Riss und ist im Bereich des Steckers Pin 1 stark verschmort (Abbildung 11).
- Der IGBT ist defekt.

Abbildung 12: Spulenansteuerung Ansicht

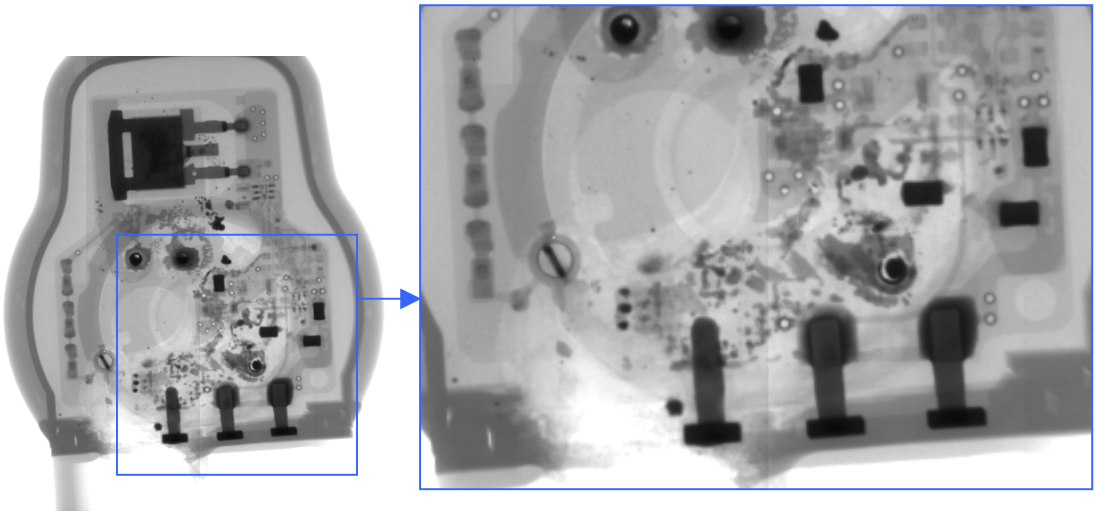


Abbildung 13: Radioskopische Untersuchung, Draufsicht

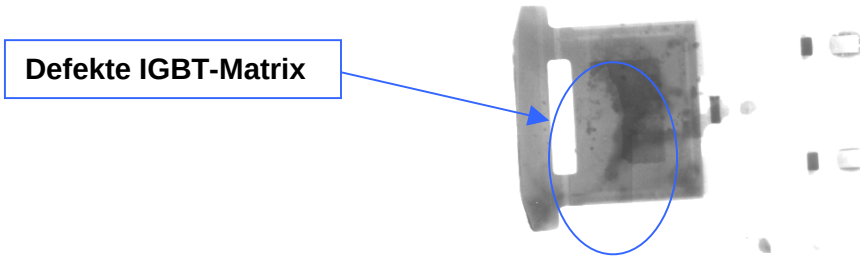


Abbildung 14: Radioskopische Untersuchung, IGBT Ansicht

11-2005.04.26-f-001

- das Material vom Primärspulenkörper und der Ansteuerelektronik wurde durch Temperatureinwirkung plastisch verformt und ist stark verschmort (Abbildung 14).

Abbildung 15: Spulenansicht

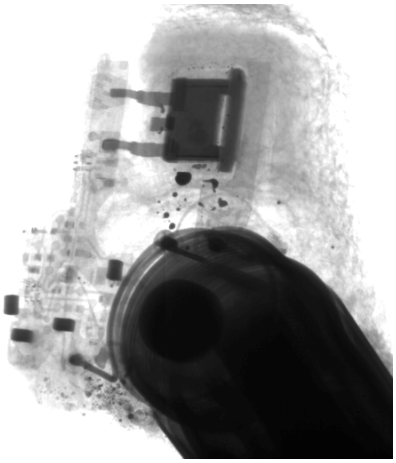


Abbildung 16: Radioskopische Untersuchung, Draufsicht

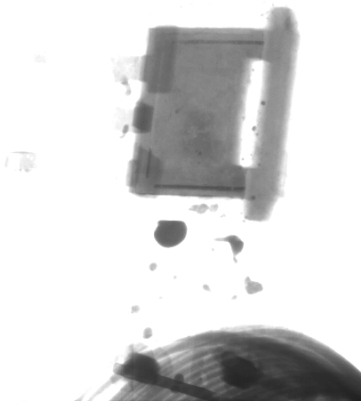


Abbildung 17: Radioskopische Untersuchung, IGBT Ansicht

11-2005.04.28-f-014

- Teile-Nummer: 06B 905 115N L1 DADB 5 32/04 Fa. Bremi
- FZG-Nr: WVWAD63B75E056942
- Die Vergussmasse über der Ansteuerplatine hat einen Riss und ist im Bereich des Steckers Pin 1 ist stark verschmort (Abbildung 17).

Abbildung 18: Ansteuerelektronik Ansicht

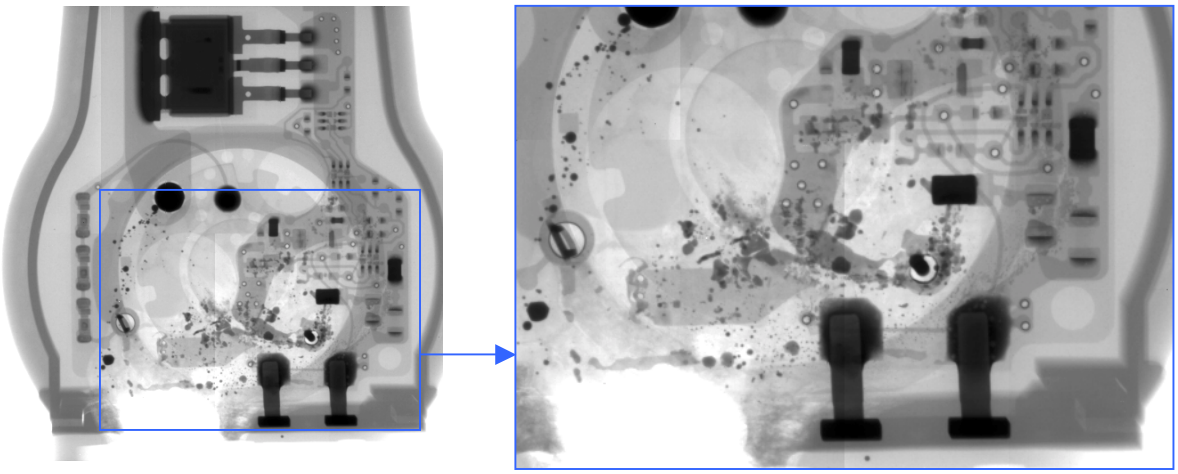


Abbildung 19: Radioskopische Untersuchung, Draufsicht

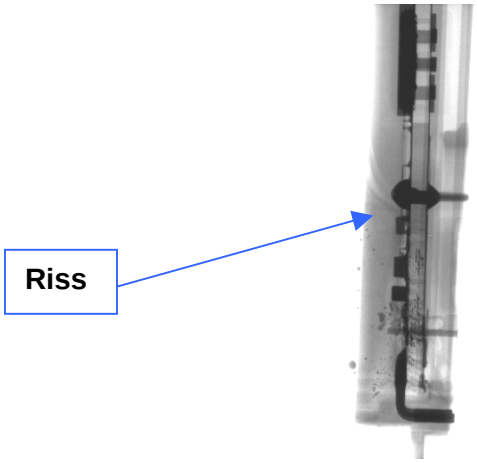


Abbildung 20: Radioskopische Untersuchung, Riss in der Vergussmasse

11-2005.04.28-f-007

- Teile-Nummer 06B 905 115L L1 N45B 5 49/03 Fa. Bremi
- FZG-Nr: WVWPD63B94P199954
- Die Vergussmasse über der Ansteuerplatine hat einen Riss und ist im Bereich des Pin 1 ist stark verschmort.
- nach dem Austrennen und Vermessen wurde festgestellt, dass der IGBT ist i.O. ist.

Abbildung 21: Ansteuerelektronik Ansicht

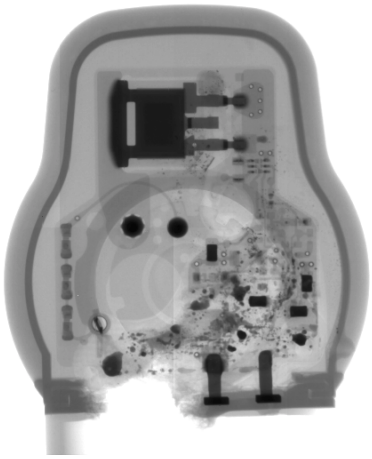


Abbildung 22: Radioskopische Untersuchung, Draufsicht

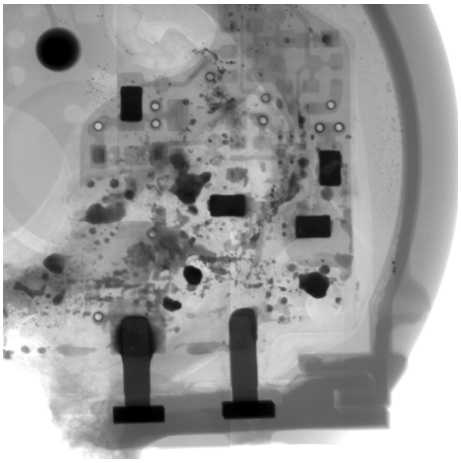


Abbildung 23: Radioskopische Untersuchung, V-Track

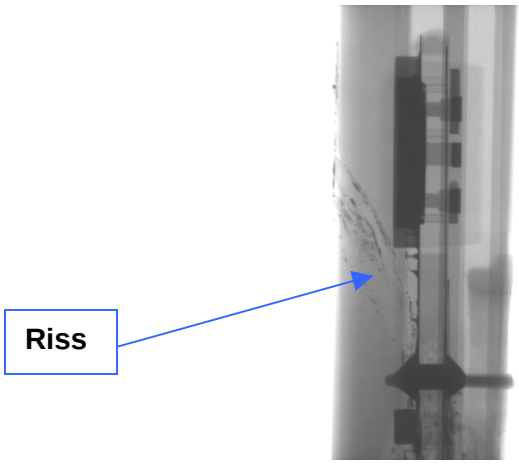


Abbildung 24: Radioskopische Untersuchung, Riss in der Vergussmasse

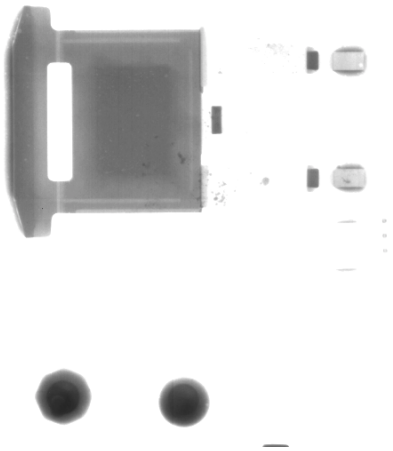


Abbildung 25: Radioskopische Untersuchung, IGBT Ansicht

Task
Fault analysis of seven ignition coils from the USA market.

2 Summary
„“.

3 Individual results

11-2005.04.28-f-008

- Part number: 022 905 100A L2 B1F5 6 11/04 Bremi
- Vehicle no.: WVGBC77L44D071365
- the material from the primary coil body was plastically deformed by a temperature adjustment (image 1).
- the IGBT is damaged. After it was ripped out, it was ascertained that the IGBT body is very strongly braised (image 5).

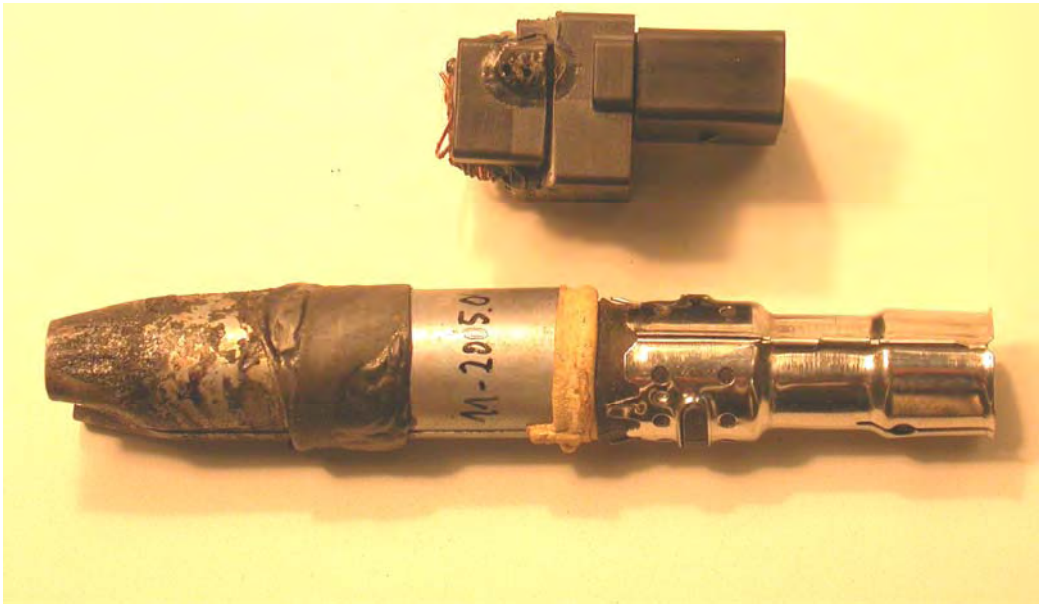


Image 1: coil view

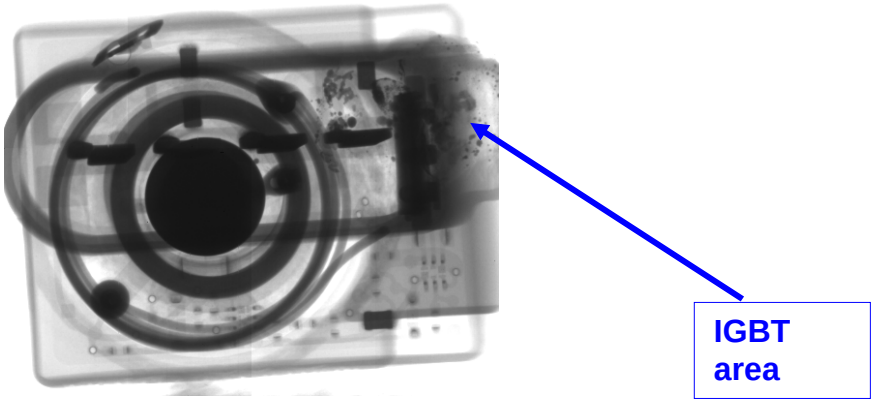


Image 2: radioscopic investigation, top view

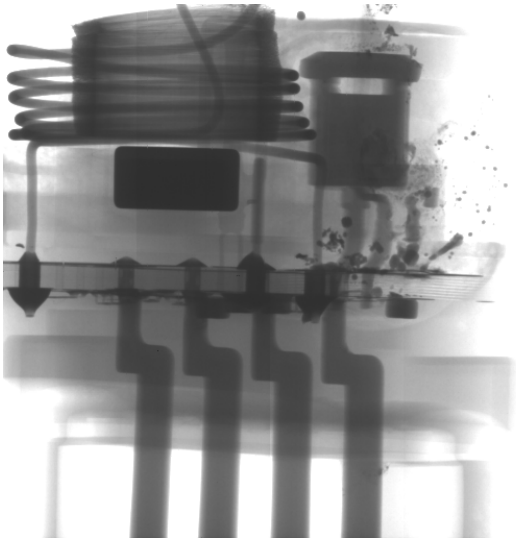


Image 3: radioscopic investigation, side view

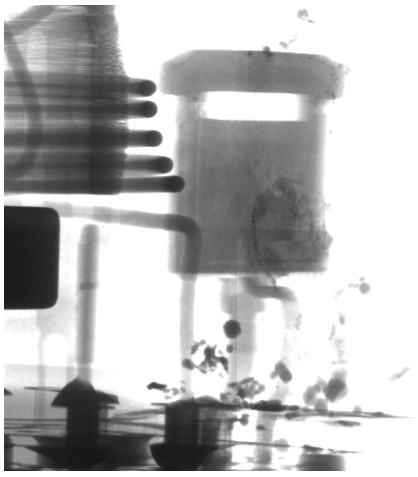


Image 4: radioscopic investigation, IGBT view

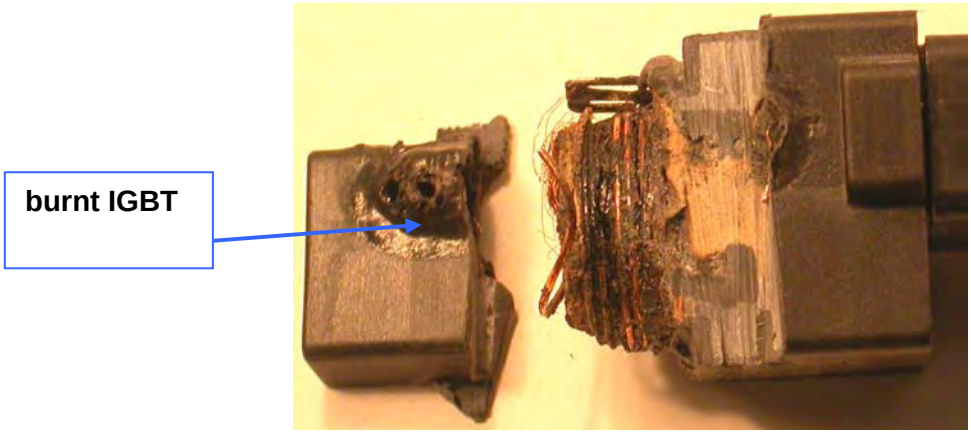


Image 5: IGBT view

11-2005.04.28-f-015

- Part number: 022 905 100A L2 5397 4 15/04 Bremi
- Vehicle no.: WVGZG77L25D020581
- the coil body material was plastically deformed in the area of the printed circuit by temperature adjustment and is charred (image 6).
- After it was ripped out and aligned it was established that the IGBT had failed.

Image 6: coil view

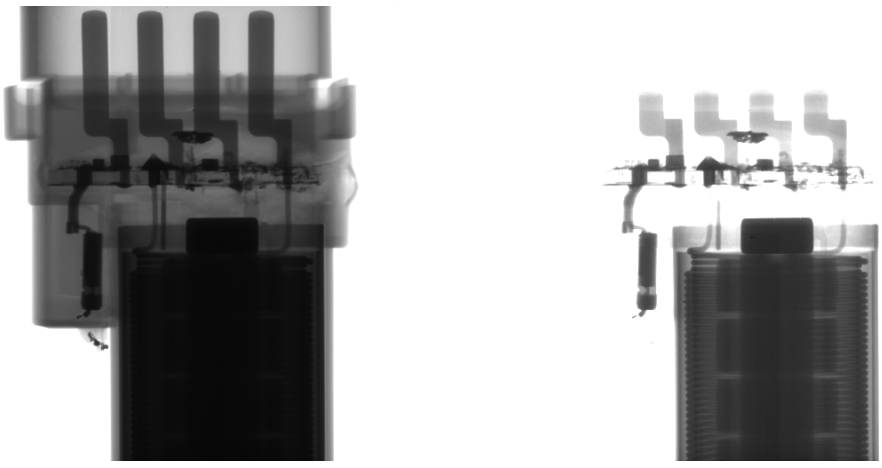


Image 7: radioscopic investigation, side view

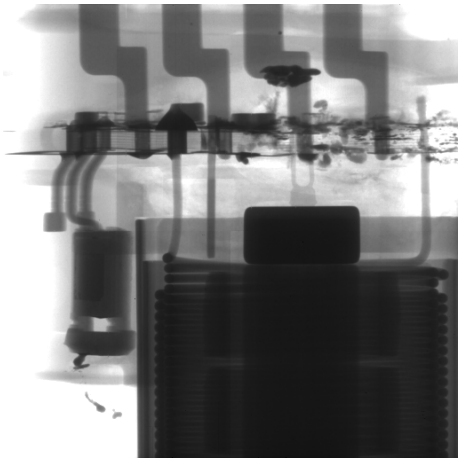


Image 8: radioscopic investigation, side view

11-2005.04.28-f-013

- Part number 06B 905 115L L1 0A8F 4 01/04 Bremi
- Vehicle no.: WVWPD63B24E239903
- the material of the primary coil body was plastically deformed by a temperature adjustment, the sealing compound over the IGBT is very dirty (image 9).

.

Image 9: coil view

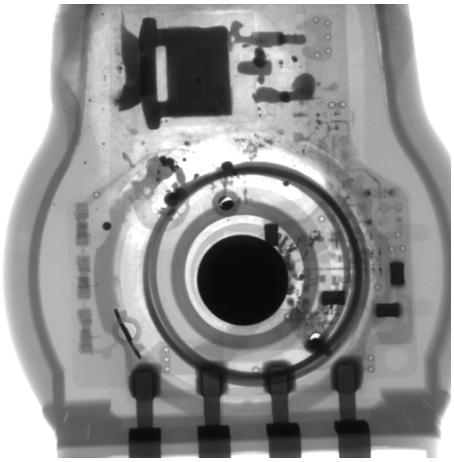


Image 10: radioscopic investigation, top view

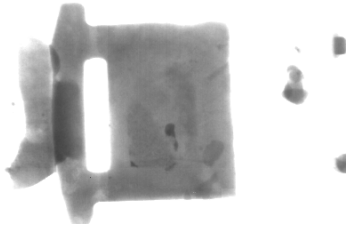


Image 11: radioscopic investigation, IGBT view

11-2005.04.28-f-012

- Part number: 06B 905 115 L L1 N93C 6 48/03 Bremi
- Vehicle no.: WVWPD63B24E239903
- The sealing compound above the control board is cracked and is very dirty in the area of the Pin 1 plug (image 11).
- The IGBT is faulty.

Image 12: coil control view

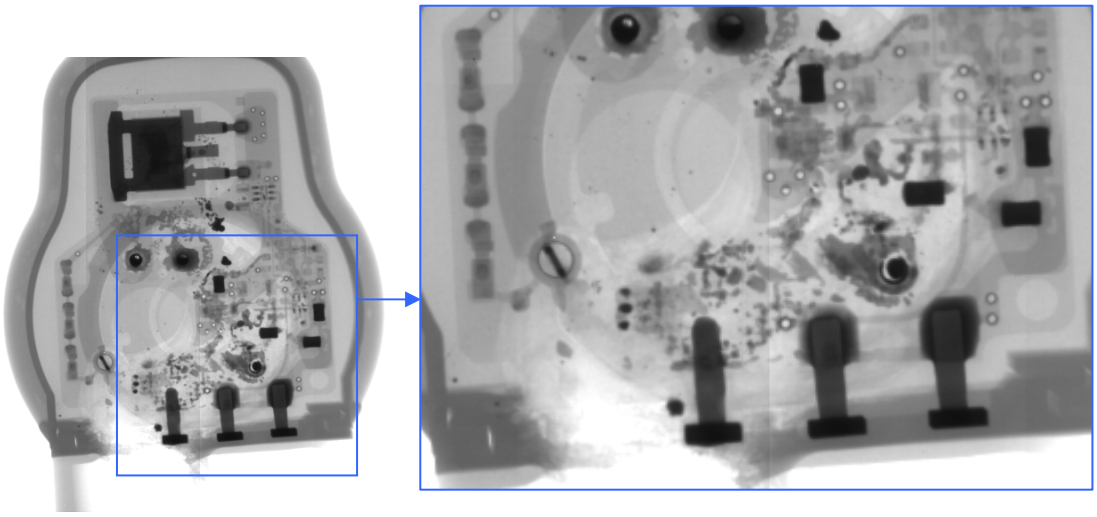


Image 13: radioscopic investigation, top view

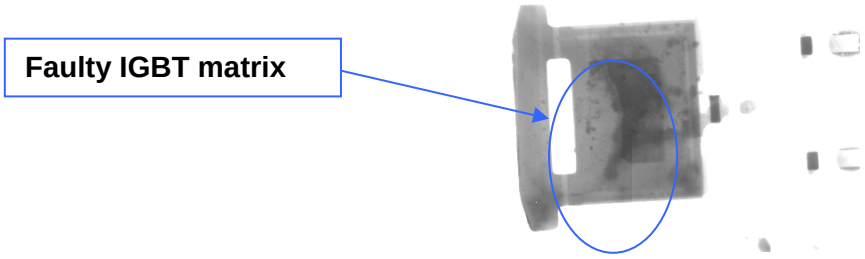


Image 14: radioscopic investigation, IGBT view

11-2005.04.26-f-001

- the primary coil body material and the control electronics were plastically deformed by temperature adjustment and are very dirty (image 14).

Image 15: coil view

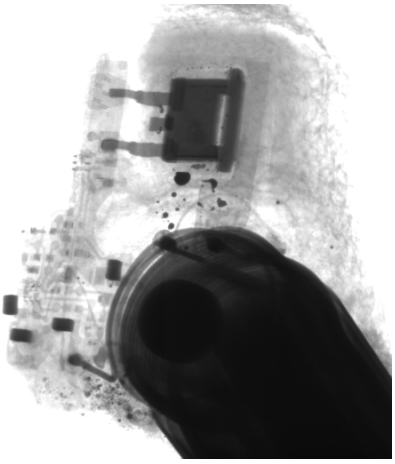


Image 16: radioscopic investigation, top view

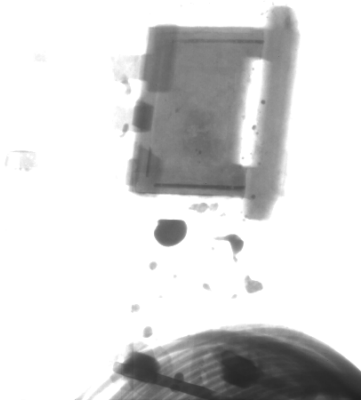


Image 17: radioscopic investigation, IGBT view

11-2005.04.28-f-014

- Part number: 06B 905 115N L1 DADB 5 32/04 Bremi
- Vehicle no.: WVWAD63B75E056942
- The sealing compound above the control board is cracked and is very dirty in the area of the Pin 1 plug (image 17).

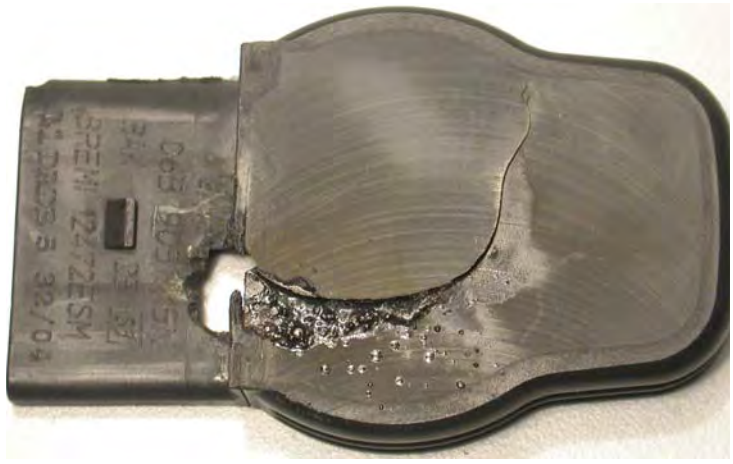


Image 18: control electronics view

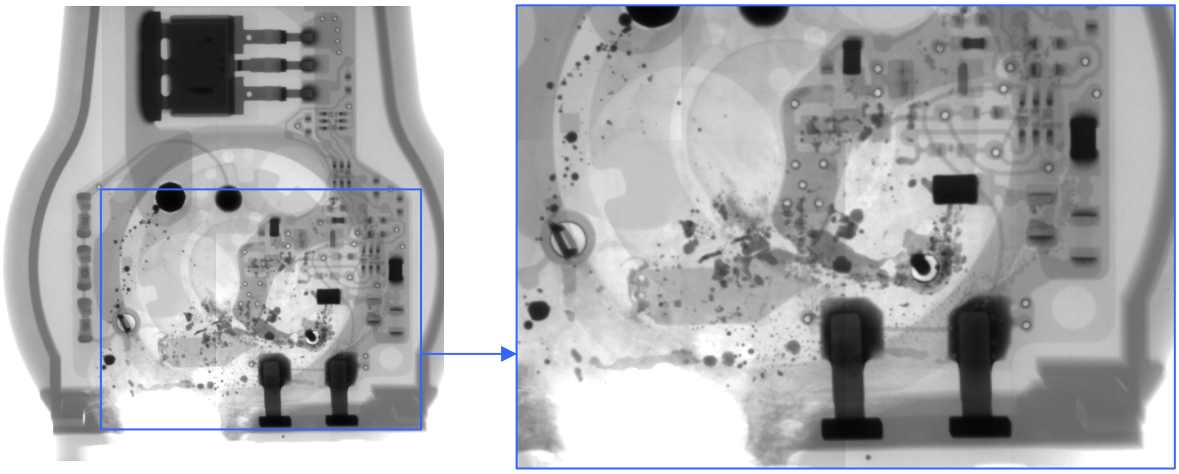


Image 19: radioscopic investigation, top view

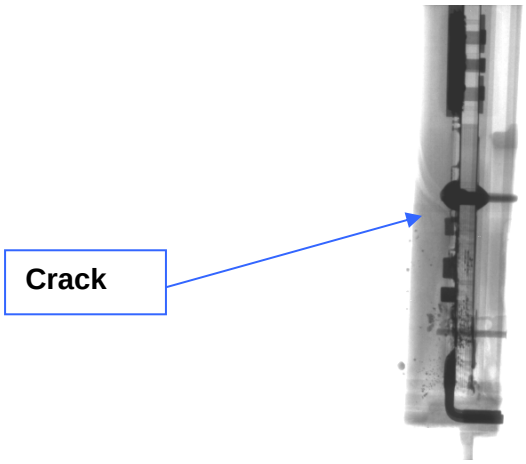


Image 20: radioscopic inspection, crack in the sealing compound

11-2005.04.28-f-007

- Part number 06B 905 115L L1 N45B 5 49/03 Bremi
- Vehicle no.: WVWPD63B94P199954
- The sealing compound above the control board is cracked and is very dirty in the area of Pin 1.
- after it was ripped out and aligned it was established that the IGBT is OK.

Image 21: control electronics view

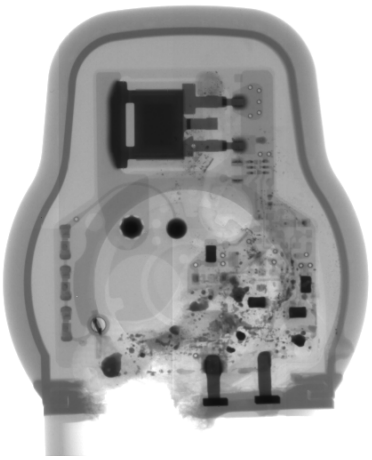


Image 22: radioscopic investigation, top view

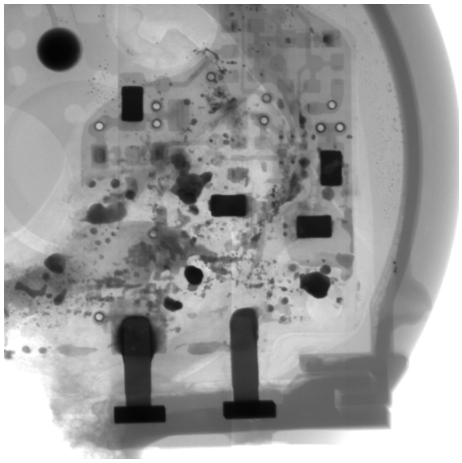


Image 23: radioscopic investigation, v-track

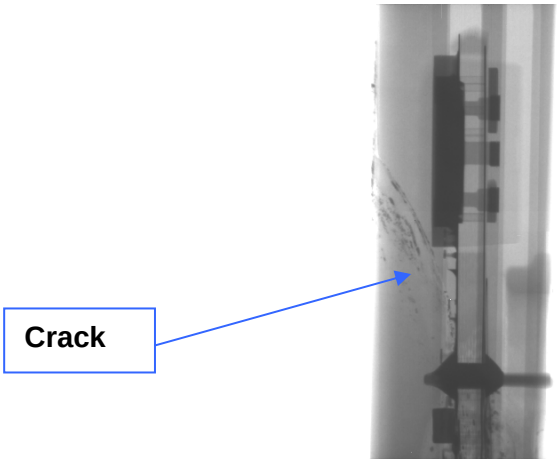


Image 24: radioscopic inspection, crack in the sealing compound

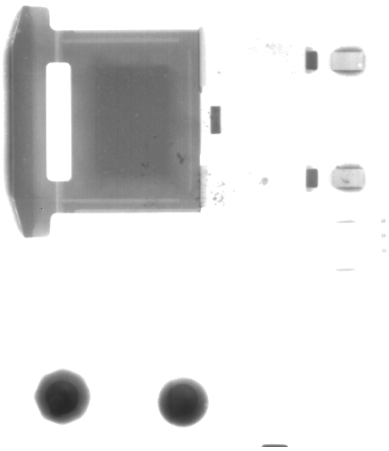


Image 25: radioscopic investigation, IGBT view

Aufgabenstellung

Fehleranalyse eines „RK“ Satzes von Stabzündspulen aus einem AUDI A4 1,8T FWD (WAU JC6 8E 74A), USA Markt,
Teilenummer: 06B 905 115L. Das FD war bei den Schadensteilen nicht erkennbar.

2 Zusammenfassung

Der Fehler wurde vermutlich durch hohe Temperatur verursacht, die von außen auf die Spulen eingewirkt hatte. Die Platine weist im Röntgenbild auf Brandschäden, die eindeutig nicht auf eine Brandauslösung hindeuten. Dennoch wurde die Platine durch die Hitze von außen so stark geschädigt, dass Pins 3 und 4 sich von der Spule gelöst haben.
Der IGBT zeigt im Röntgenbild ebenfalls keine Auffälligkeiten, wie zum Beispiel aufgeschmolzenes die-attach-Lot.
Die vorliegende Stabzündspule war vermutlich damit nicht Brandauslösend.

3 Einzelergebnisse

11-2005.07.19-f-001-004

Abbildung 1: Übersicht der SZS 11-2005.07.19-f-001-004

Durch starke thermische Einwirkung sind alle SZS sehr stark plastisch verformt, besonders die Spule 11-2005.07.19-f-001 (Abbildung1, erste Teil links).

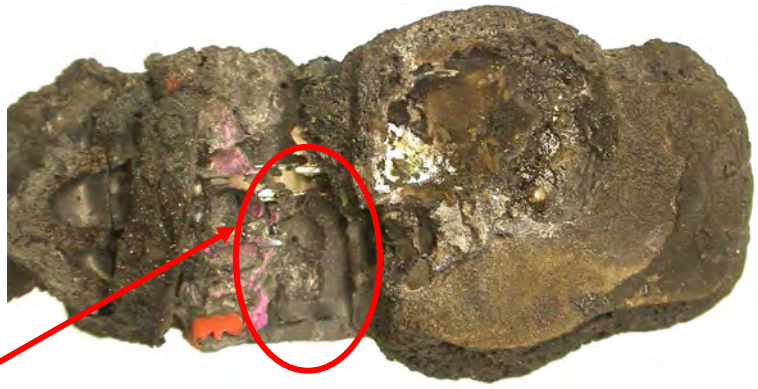


Abbildung 2: Teil 11-2005.07.19-f-001 Draufansicht

Pin 3 und 4 nicht mehr vorhanden an den Untersuchten Teil.

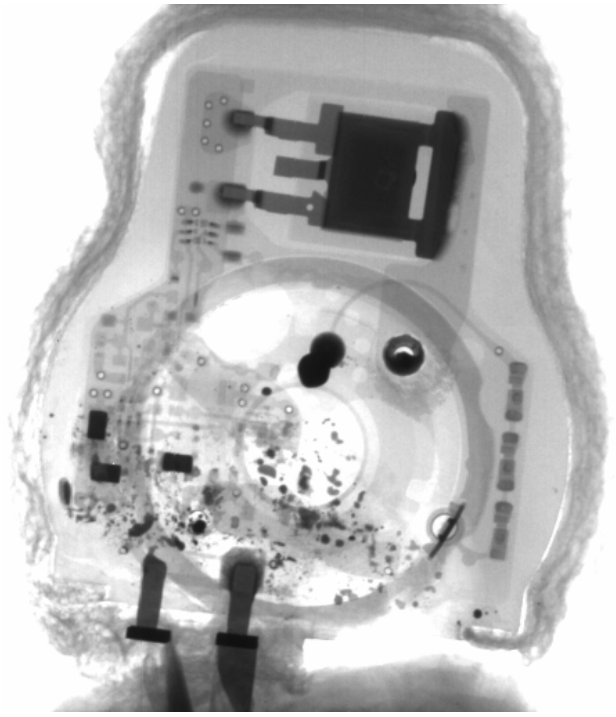


Abbildung 3: : Teil 11-2005.07.19-f-001 Radioskopie Bild

Die Radioskopische Untersuchung zeigte Brandspuren auf der Platine von der Spule und Lötspritze, die Pins 1 und 2 (Kl. 15 und Masse) sind noch gut angebunden an die Platine.

Task

Fault analysis of an 'RK' batch of ignition coils from an AUDI a4 1.8T FWD
(WAU JC6 8E 74A), USA market,
Part number: 06B 905 115L. The FD was not recognisable in the damaged parts.

2 Summary

The fault was probably caused by high temperature which affected the coils from the outside. The printed circuit x-ray shows fire damage which clearly do not suggest a fire. Yet the printed circuit was so badly damaged by the heat from the outside that Pins 3 and 4 were both released from the coil. The IGBT does not show any irregularities in the x-ray either, such as melted die attach solder, for example.
The ignition coil at hand was presumably not the cause of a fire.

3 Individual results

11-2005.07.19-f-001

Image 1: Overview of SZS 11-2005.07.19-f-001-004

All SZS are very plastically deformed because of strong thermal effects, particularly the 11-2005.07.19-f-001 coil (image 1, first part on left).

Image 2: part 11-2005.07.19-f-001 plan view

Pin 3 and 4 are not longer available in the investigated part.

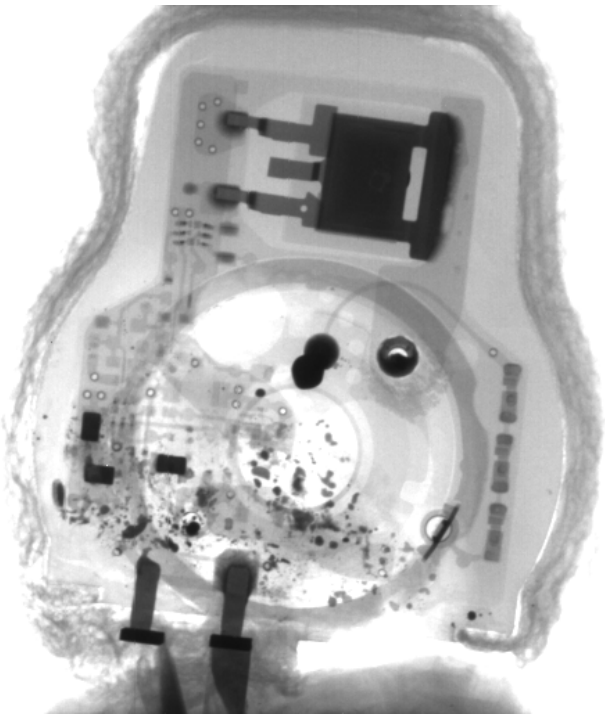


Image 3: : part 11-2005.07.19-f-001 radioscopic image

The radioscopic investigation shows scorch marks on the printed circuit of the coil and solder tip; Pins 1 and 2 (Cl. 15 and dimensions) are still well-attached to the printed circuit.

Volkswagen AG Konzern-Qualitätssicherung **Zentrallabor** K-GQL-1/2, 1437/1 **11-Z-05-4271_1**Abschlußbericht Bildablage:		Eingang Auftrag 12.09.2005 Eingang Teile EA / WA Zeichnungs-Nr. .06B.905.115.L Zeichnungs-Datum Baumusterpflichtig Nein Berichts-Datum 19.09.2005 **Note Bemusterung -** **Aufwand Stunden:**
Stabzündspulen aus Kunden-Fzg. Audi A4 1,8T USA		Seite 1 von 1

1 Aufgabenstellung

Zur Analyse erhielten wir zwei Stabzündspulen die einen Belag aufwiesen und drei Prozeßmaterialien zum Vergleich.

2 Zusammenfassung / 3 Einzelergebnisse

Der grüne Belag auf der Stabsündspule hat deutliche Bestandteile eines mitgelieferten Klebers (Butoxyethoxy-Ethanol und Butoxyethyl-Adipat). Diese beiden Komponenten sind auch die Hauptbestandteile des Klebers. Bei dem Kleber (AMV 188003 TU, Typ 1118) handelt es sich um einen Polyurethankleber. Die weiteren Komponenten in den grünlichen Belag auf der Stabzündspule könnten Abbauprodukte des Polyurethans seien es handelt sich hier um Polyetheracrylate.

Der bräunliche Belag auf der zweiten Stabzündspule zeigt eine ganz unspezifische Zusammensetzung, dort sind Weichmacher, Säureester und 2Ethyl-1-Hexanol die größten Peaks. Die Herkunft ist aber nicht geklärt.

Das Gleitmittel (Dr. Hoeck GS52) hat Heptanal und Methylnaphthalin als Hauptkomponenten, die jedoch in den Belägen nicht gefunden wurden.

Das Seifendichtspray (E-Coll 005-159) enthält lediglich Undecanol und wurde ebenfalls nicht in Belägen gefunden.

Häufig finden sich Aldehyde in den Belägen, diese könnten aus den eingesetzten Prozesschemikalien stammen sind aber zu unspezifisch.

4 Durchführung

Die Messungen wurden mittels TDS-GC-MS durchgeführt.

Dieser Bericht wurde elektronisch erstellt und trägt daher keine Unterschrift

Hälle 4 @ 57

Klausurtag - 01
Gleitmittel

Ignition coil of customer vehicle Audi A4 1.8T, USA

1. Task

We have received two ignition coils with a deposit and three process materials for comparison.

2. Summary / 3 results

The green deposit on the ignition coil clearly has components of a supplied bonder (butoxy ethosy ethanol and butoxy ethyl adipate). These two components are also the main constituents of the bonder (AMV 188003 TU, type 1118), which is an polyurethane bonder. The components of the green deposits on the ignition coil could be decomposition products of the polyurethane, they are poly ether arylate.

The brown deposit on the second ignition coil has an unspecified composition, mainly softeners, acid ester and 2 ethyl 1 hexanol. The origin is unclear.

The lubricant (Dr Hoeck GS52) has heptanal and methyl naphtalin as its main components, but these were not found in the deposits.

The soap spray (E-Coll 005-159) includes only undecanol and was also not found in the deposits.

Aldehydes are often in the deposits, which could be from chemicals used in the processes, but they are unspecified.

Audi
Quality assurance

Test Report FIELD

Complaint number	*Entry date*	*Factory*	*Complaint location*
0002087591	23.06.2005	38	USA

Damage part 06B 905 115 N Ignition coil

Delivered part 06B 905 115 N Ignition coil

Supplier 00001542 00 PULSE POWERTRAIN GMBH & CO. KG MEINERZHAGEN
AM ROTTLAND 12 58540 MEINERZHAGEN;GERMANY

FSN *Dept.* *Telephone*

Parts manager

Damage assessor

SAGA code

Make	*Prod. daught.*	*ISO*	*DC*	*Partner*	*Task no.*	*Serial no. application date*
A	0200	USA	444	444	******	**

VIN	*Replacement part*	*Damage type BD*
WAUAC48H35K017834	06B 905 115 N	

Vehicle type	*Km reading*	*Delivery date*	*Repair date*	*Control data*
8H752H	0			

Service no. 2820 ignition coil *Type of damage*

No. of complaint items	*No. of work items*	*Part manufacture date*	*Comment*
1,00	1,00	13.11.2004	

Complaint text

Complaint code *Complaint code text*

Fault code *Fault code text*
E0G15 Component overloaded / semi-conductor components

Originator *Comment* *From VIN*
Supplier TV1227438

QTS status	*Delivery status*	*Completion indicator*	*In usage date*
3 06.10.2005	18.07.2007		

Test report no.	*Costs to be borne by*	*No. of cost items*
05662786	Supplier 00001542 00	1,00

Cause/Action

EMC elements C12 und R41 connected in series destructed, possible local fault sources:
a) Soldering fault/soldering residue
b) Mechanical crack of condenser C12
c) Overvoltage in the power supply system

FAILURE ANALYSIS REPORT

DATE: 16/11/2005	**N.:** R050203R001	**TOTAL NUMBER OF PAGES:** 5
FROM: Piras A. Automotive		DEPT: AUTOMOTIVE DIRECT FAX: DIRECT PHONE:
TO: Mr. Giere - VW		ATTN: DEPT: FAX:
INT. COPY: Santagata G. / Spataro G. / Croci A.		EXT. COPY:
SUBJECT: FAILURE ANALYSIS REPORT		

Issued by :	Piras A.
Checked by :	Santagata G.

1) TEAM

Team is composed by: Santagata G./ Piras A.

2) PROBLEM DESCRIPTION AND DATA

Eldor product code	78230005
Eldor data code or reference	05F5 II 4 12/05
Customer reference	11-2005.11.01-f-005
RMA	84001270
Arrival data	03/11/2005
Origin of the part and people reference	VOLKSWAGEN AG – Mr. Giere
Part coming from ? Field, Factory, Motor Test, etc.	Field
How much km/h/cycle?	5000 Km
Customer defect	Unknown

3) CONTAINMENT ACTIONS

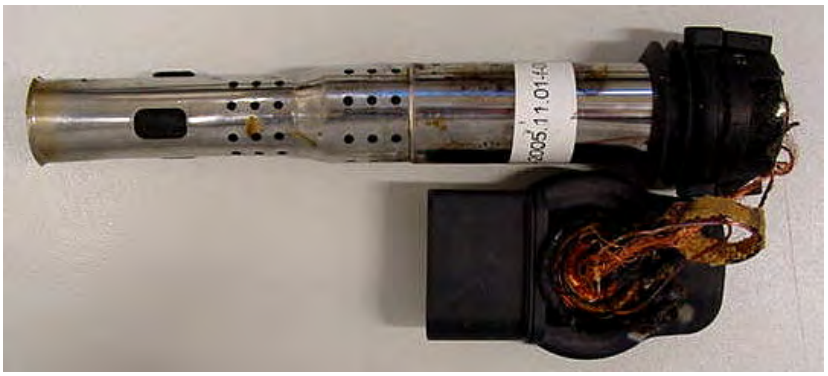
None

4) ROOT CAUSES:

A) VISUAL INSPECTION

The coil received is damaged, photo 1.

Photo 1



B) ELECTRICAL TEST

The pencil coil was electrically verified in Eldor in the follow condition Vbatt =14V @ IP=0A; Freq.= 50Hz; IP = 15A; Load 1M//25pF.

It was not possible to check the coil in this condition.

C) PRELIMINARY X-RAY

The X-ray, show the damaged area near Igbt (photo 2) and the crack in plastic over the Igbt (photo 3).

Photo 2

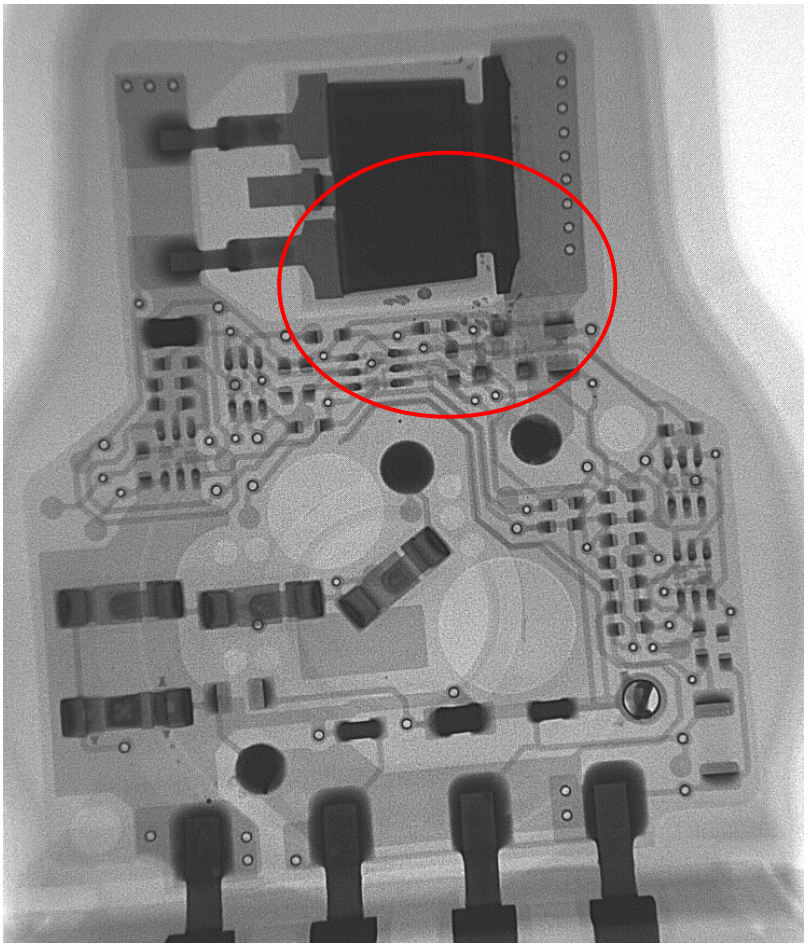
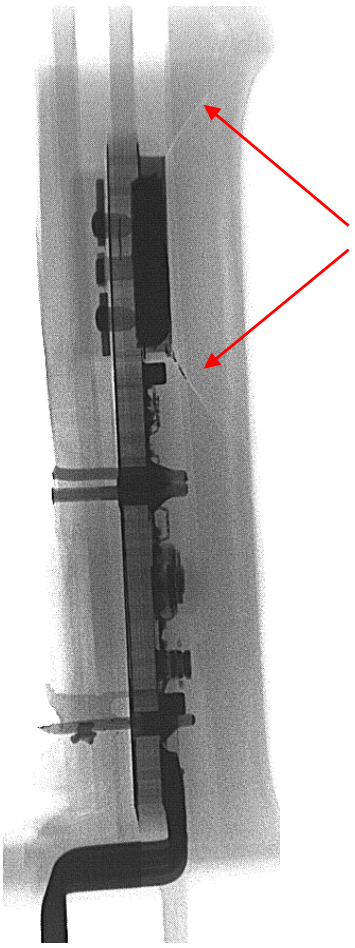


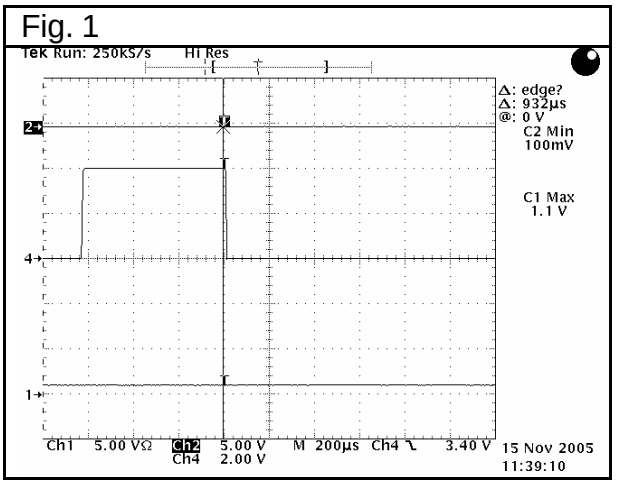
Photo 3



D) ANALYSIS OF WINDINGS AND ELECTRONIC

The electronic was checked with sure good windings : KO, fig. 1.

Fig. 1



The Igbt was tested with a sure good electronic and windings : KO, fig. 2.
So also the electronic was tested with a sure good Igbt and windings: OK, fig. 3.

Fig. 2

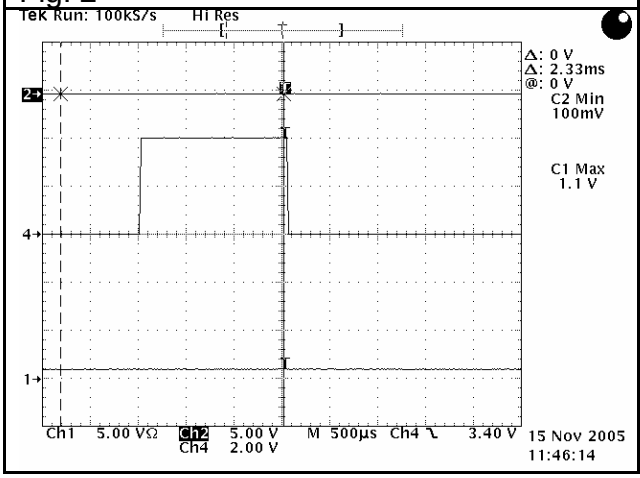
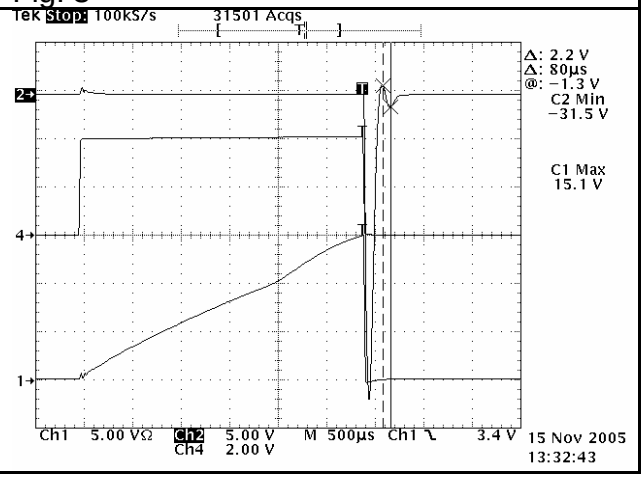


Fig. 3



The IGBT was measured the resistance between the leads:

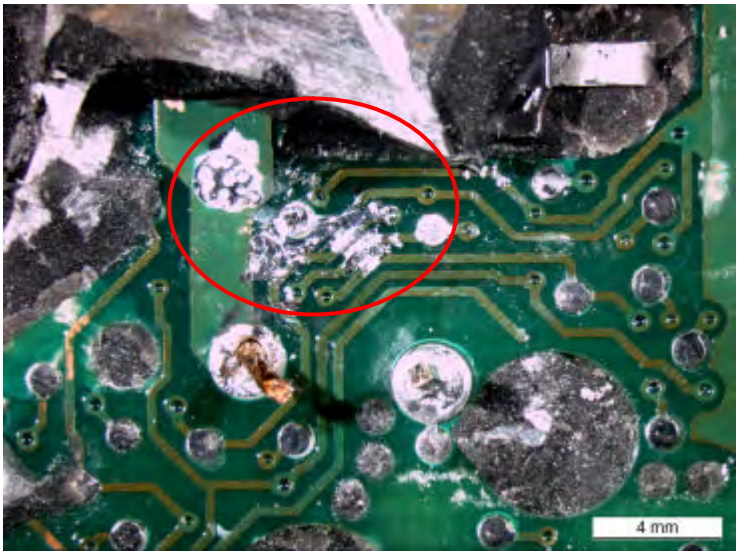
Rec = Open.
Rcg = 625 K ohm.
Reg = Open.

IGBT FC damaged.

Photo 4, show the electronic without the epoxy.
Photo 5, show the area with soldering material coming from the IGBT or wire soldering points .

Photo 4

Photo 5

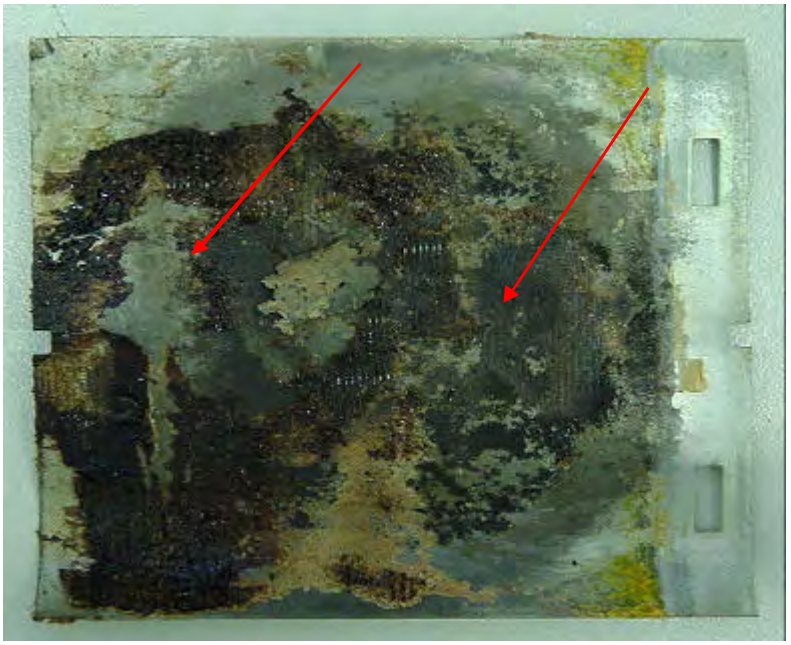


The windings appear very burned, photo 6.

Photo 6

Photo 7, show the inside of the shield with plastic melted.

Photo 7



E) DEFECT
Failure analysis data:
Igbt FC damaged.
Windings burned.
The electronic work normally with a sure good Igbt.

Due to the fact the coil received is very burned it is impossible to recognize exactly the failure cause, we can make only some hypothesis.
1) IGBT problem.
2) Humidity penetration which has determined the continuous switch on of the IGBT until the melting of the primary plastic.
3) Possible wrong insertion on the coil on the spark plug (air gap between the HV plug and the spark plug) which has determined a re-driving of the coil.

5) CORRECTIVE ACTIONS

1) IGBT

At moment the supplier hasn't planned to overview the screen method for the GEN 3 IGBT . FC declare that a different method will be introduced only for the Gen IV IGBT
Please refer to the following mail received from FC

"Dear Mr Giere,
the differential test is not yet introduced. We are still working on the details of the schedule for introduction of this test at our production site in Cebu, Philippines.
We are planning on a production pilot run first, to confirm the setup and limits. After successful run, we intend to convert all the Gen IV IGBTs going into the VW application to provide a clear cut-off datecode (on device level) to you.

Please note that the differential test was only discussed for Gen IV devices, but not for the the Gen III devices where the recent failures showed up. There is no current plan to introduce the differential test for Gen III devices, too.

By next week we shall have a better picture on the introduction schedule.

Mit freundlichen Gruessen / best regards,
Stefan Reinkensmeier
FAIRCHILD Semiconductor
Component Engineering/Quality Europe

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A new generation of IGBT will be used with the new FSI coil Gen II planned for wk 34/06

2) Introduction of a new head rubber with a shape which guarantee the sealing between the ambient and the plug well -> wk 04/06.
Introduction of a new Gen II pencil coil with primary potted completely insulated from the humidity penetration problem -> 34/06.

3) We suggest the customer to control the correct position of the coil inside the plug well.

6) CORRECTIVE ACTIONS IMPLEMENTATION

See point 5.

7) PREVENT THE RECURRENCE

See point 5.

8) TEAM CONGRATULATION

Not applied.

FAILURE ANALYSIS REPORT

DATE: 20/02/2006	**N.:** R060005R003	**TOTAL NUMBER OF PAGES:** 7
FROM: Piras A. Automotive		DEPT: AUTOMOTIVE DIRECT FAX: DIRECT PHONE:
TO: Mr. Giere - VW		ATTN: DEPT: FAX:
INT. COPY: Santagata G. / Spataro G. / Croci A. / Mottola M.		EXT. COPY:
SUBJECT: FAILURE ANALYSIS REPORT		

Issued by :	Piras A.
Checked by :	Santagata G.

1) TEAM

Team is composed by: Santagata G./ Piras A.

2) PROBLEM DESCRIPTION AND DATA

Eldor product code	78230005
Eldor data code or reference	25F6 II 1 11/05
Customer reference	11-2006.01.23-f-017
RMA	84001345
Arrival data	31/01/2006
Origin of the part and people reference	Volkswagen – Mr. Giere
Part coming from ? Field, Factory, Motor Test, etc.	Field
Engine used	3vwdf71k55m638884
How much km/h/cycle?	3000 Km
Customer defect	Flüssigkeitsrückstände am Rückschlußblech, PIN 1 verbrannt, Deckverguß aufgeplatzt

3) CONTAINMENT ACTIONS

None

4) ROOT CAUSES:

A) VISUAL INSPECTION

The coil appear very damaged in the head area, photo 1.

In the surface of the long shield there is a unknown material, we suppose that this material coming from the motor plug well.

Photo 1

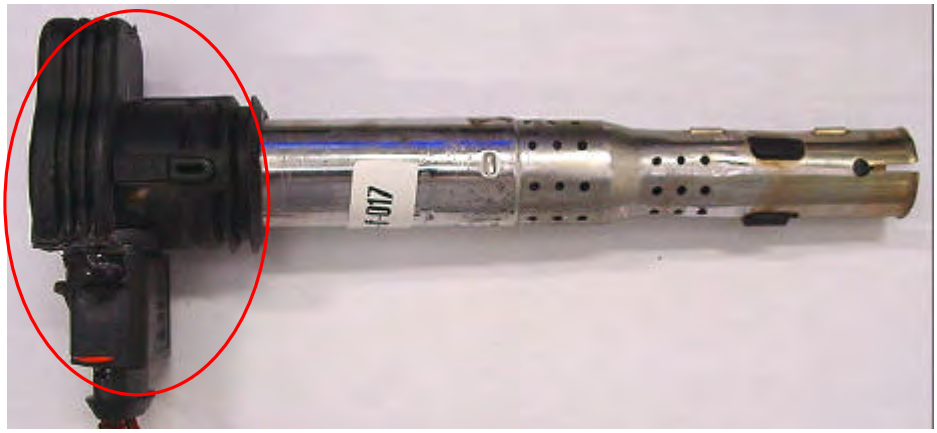


Photo 2, show the zoom of the unknown material present on the long shield.

Follow, the material has been scratched from the surface of the long shield, photo 3.

Not residual remaining on the surface. So no oxidation observed.

Is our opinion that the unknown material was coming from the engine.

Photo 2

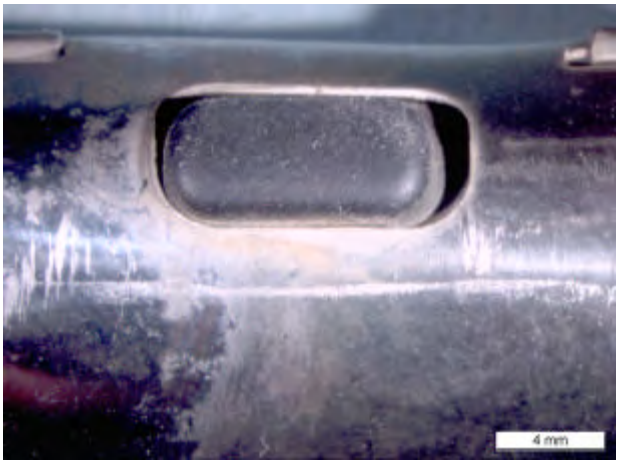


Photo 3

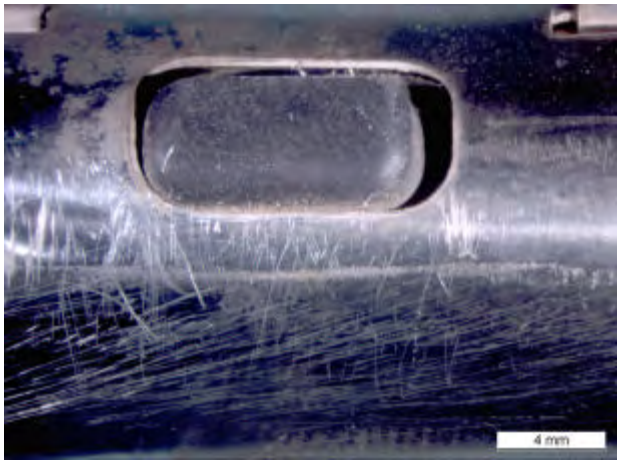


Photo 4, show head of the coil very damaged.

Photo 4

B) ELECTRICAL TEST
The pencil coil was electrically verified in Eldor in the follow condition Vbatt =14V @ IP=0A; Freq.= 50Hz; IP = 15A; Load 1M//25pF.

It was not possible to check the pencil electrically.

C) PRELIMINARY X-RAY
The X-ray, show the electronic very damaged, photo 5.
Is present some soldering material due to the high temperature reach by the pcb in pin1 area, photo 6.

Photo 5

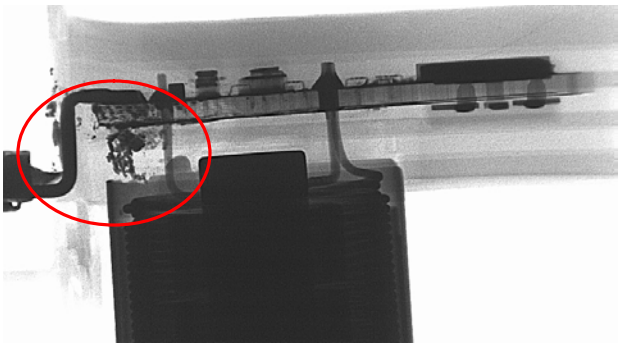
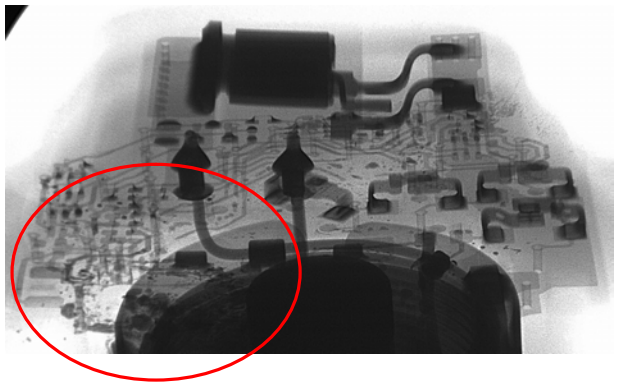


Photo 6



D) ANALYSIS OF WINDINGS AND ELECTRONIC

The Igbt was extract from the pencil and checked it in a sure good electronic: Ko, fig. 1.
So also the windings were tested with a sure good electronic: Ok, fig. 2.

Fig. 1

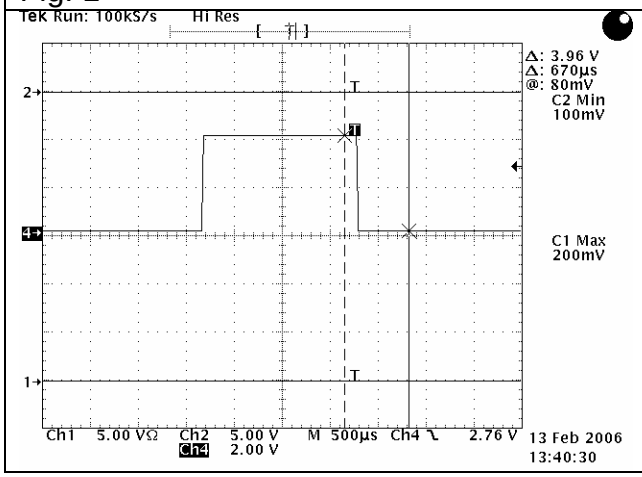
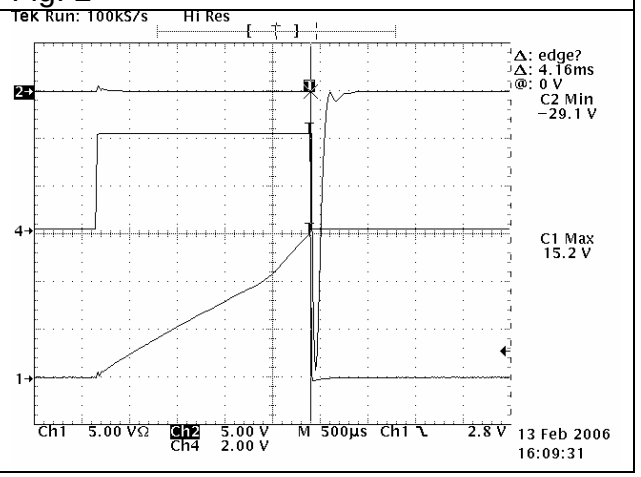


Fig. 2



<u>Resistance measurement of the IGBT :</u>

Rec = open.
Rcg = open.
Reg= 4,84 ohm.

IGBT damaged.

The X-ray, show the burned area on the electronic and the soldering residual, photo 7.
Photo 8, show the pcb burned.

Photo 7

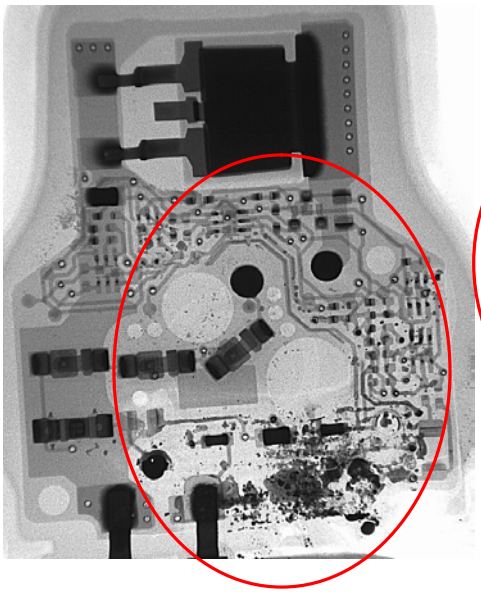
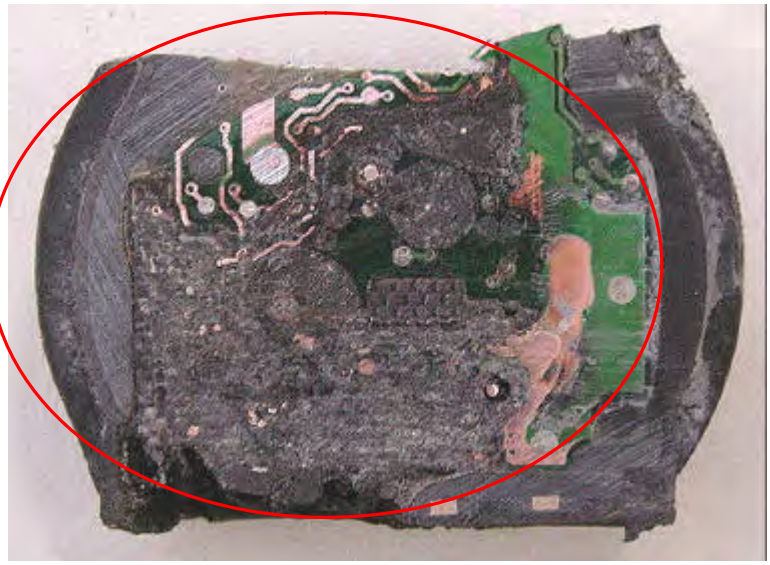


Photo 8

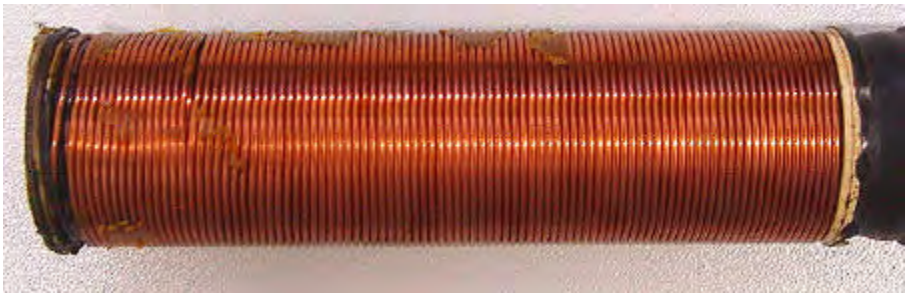


Not discharge point are observed, photo 9.
In LV area is visible the primary coil former burned. The primary winding is not damaged.

Photo 9

In the coil was removed the plastic tape for to check the integrity of the primary windings, photo 10. The windings appear in good condition.

Photo 10



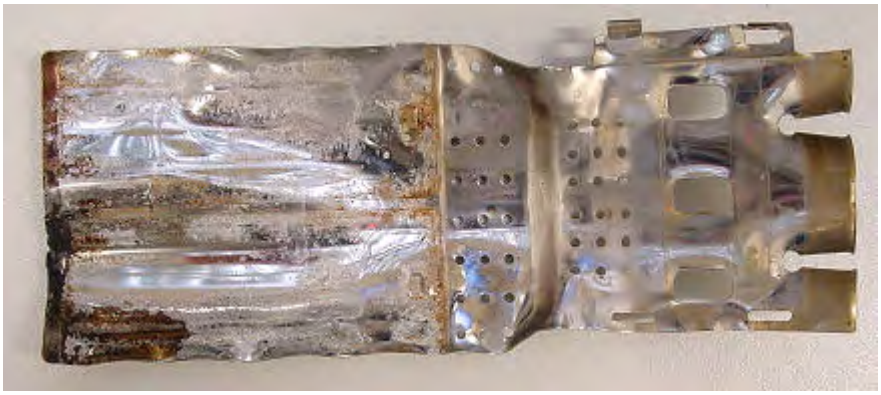
No contact point were observed in the external (photo 11) and internal (photo 12) surface of the shield. On the surface of the shield it was observed the oxidation.

Photo 11

Photo 12

No discharge point were observed in the surface of the long shield, photo 13.
There is the oxidation residual coming from the internal shield.

Photo 13



	Defect in the winding
	Defect in electronic
X	**Other**

E) DEFECT

Failure analysis data :

- Windings work normally.
- Igbt not function.
- Electronic not again available for further analysis because to much burned.
- No discharge point observed between the primary windings and the shield.
- Oxidation present on the surface of the shield.

For the present residual of unknown material on the surface of the long shield we suggest the customer to check the possible material present on the engine that can moved on the pencil coil.

Therefore, in our opinion there was probably humidity penetration on the shield that has determined the oxidation of the internal metal shield.

Failure cause hypothesis:

1) Probably humidity penetration on the pcb that has determined the burning of the electronic.
2) Soldering residuals present between the pin 1 and 2 .
3) Misalignment between the cover of the engine and engine that can determine a wrong contact between the head rubber and the cover and the permits humidity and dust penetration in the plug well.

5) CORRECTIVE ACTIONS

For humidity penetration:

Change of the head rubber in order to guarantee a better sealing between the plug well and the ambient area in all tolerances condition -> in wk 04/06.

For soldering residuals:

Starting from week 06/06 (09/02/2006) will be inserted in the production line 2 the completely automatic washing of the pcb to remove eventual soldering material coming from the soldering phase.

We suggest the customer to check the possible misalignment between the engine and the cover which contain the head rubber, in order to be sure that the head rubber work in good mode and guarantee the perfect sealing between the plug well and the engine ambient.

6) CORRECTIVE ACTIONS IMPLEMENTATION

New FSI pencil coil Gen II with primary potted -> in wk 35/06.

7) PREVENT THE RECURRENCE

See point 5.

8) TEAM CONGRATULATION

Not applied.

FAILURE ANALYSIS REPORT

DATE: 20/02/2006	**N.:** R060005R004	**TOTAL NUMBER OF PAGES:** 6
FROM: Piras A. Automotive		DEPT: AUTOMOTIVE DIRECT FAX: DIRECT PHONE:
TO: Mr. Giere - VW		ATTN: DEPT: FAX:
INT. COPY: Santagata G. / Spataro G. / Croci A. / Mottola M.		EXT. COPY:
SUBJECT: FAILURE ANALYSIS REPORT		

Issued by :	Piras A.
Checked by :	Santagata G.

1) TEAM

Team is composed by: Santagata G./ Piras A.

2) PROBLEM DESCRIPTION AND DATA

Eldor product code	78230005
Eldor data code or reference	04F1 II 2 16/05
Customer reference	11-2006.01.23-f-018
RMA	84001345
Arrival data	31/01/2006
Origin of the part and people reference	Volkswagen – Mr. Giere
Part coming from ? Field, Factory, Motor Test, etc.	Field
Engine used	3vwsf31y86m300658
How much km/h/cycle?	6000 Km
Customer defect	Flüssigkeitsrückstände am Rückschlußblech, PIN 1 verbrannt, Spaltkorrosion am Spalt Rückschlußblech (Spannungsreihe)

3) CONTAINMENT ACTIONS

None

4) ROOT CAUSES:
A) VISUAL INSPECTION
The pin 1 was missing in the head connector, photo 1.
In the surface of the long shield there is a unknown material, we suppose that this material coming from the motor plug well.

Photo 1

Photo 2, show the oxidation present in the internal shield.

Photo 2

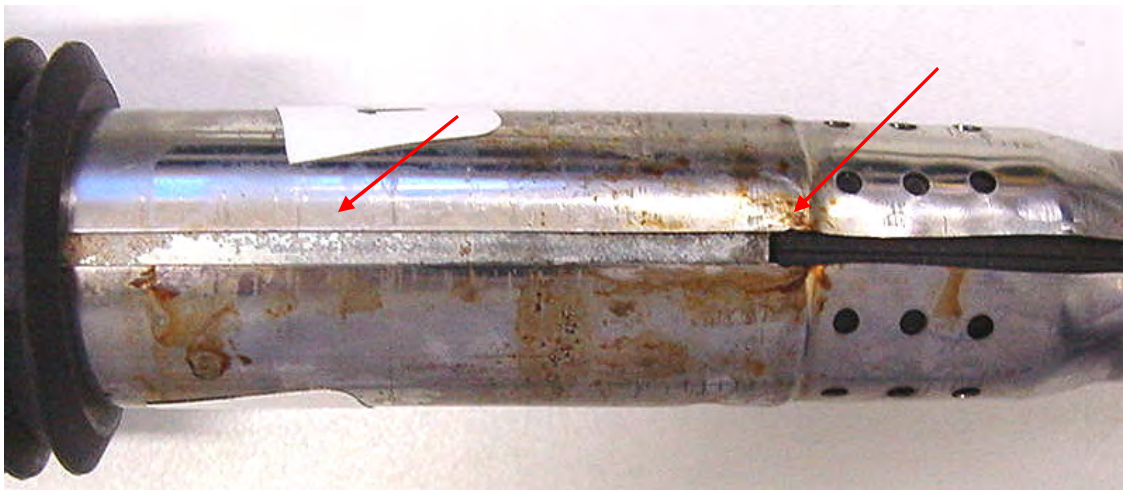


Photo 3, show the zoom of the unknown material present on the long shield.
Follow, the material has been scratched from the surface of the long shield, photo 4.
Not residual remaining on the surface. So no oxidation observed.
Is our opinion that the unknown material was coming from the engine.

Photo 3

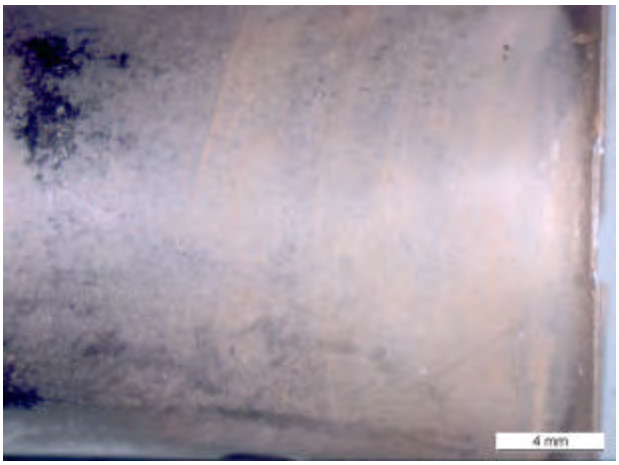


Photo 4

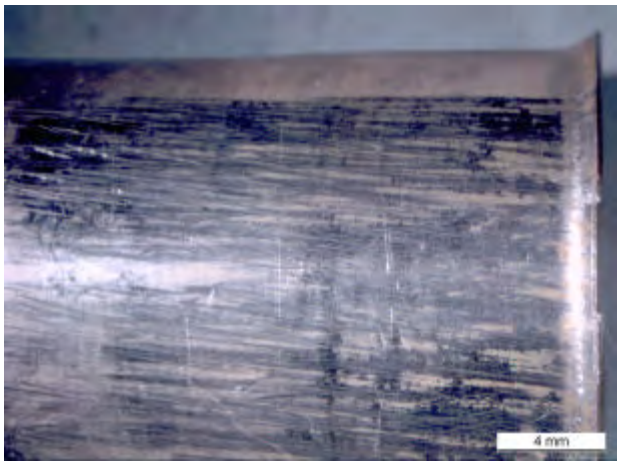
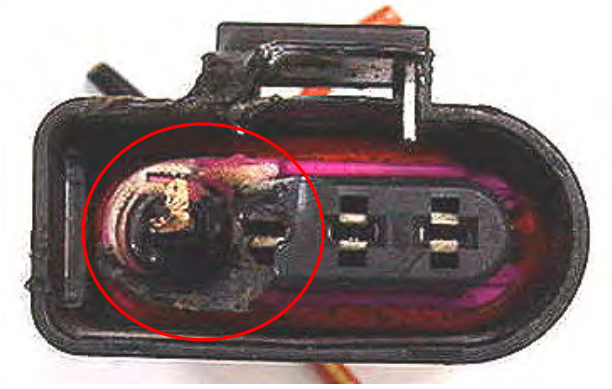


Photo 5, show the connector LV with the pin 1 of the head connector.

Photo 5



B) ELECTRICAL TEST
The pencil coil was electrically verified in Eldor in the follow condition Vbatt =14V @ IP=0A; Freq.= 50Hz; IP = 15A; Load 1M//25pF.

It was not possible to check the pencil electrically.

C) PRELIMINARY X-RAY
The X-ray, show the electronic very damaged, photo 6.
Is present some soldering material due to the high temperature reach by the pcb in pin1 area, photo 7.

Photo 6

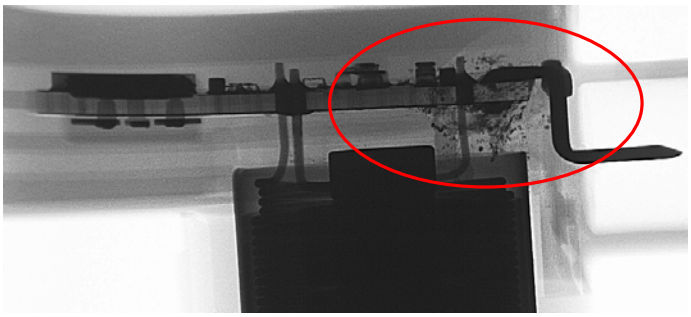
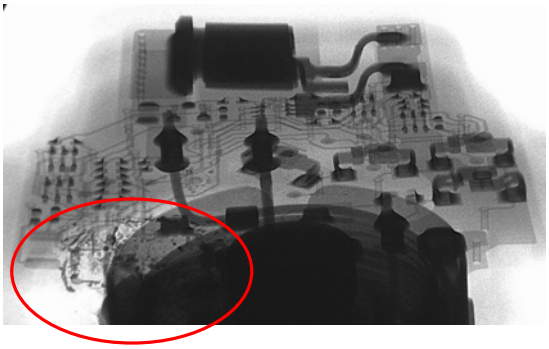


Photo 7



D) ANALYSIS OF WINDINGS AND ELECTRONIC

The Igbt was extract from the pencil and checked it in a sure good electronic: Ok, fig. 1.
So also the windings were tested with a sure good electronic: Ok, fig. 2.

Fig. 1

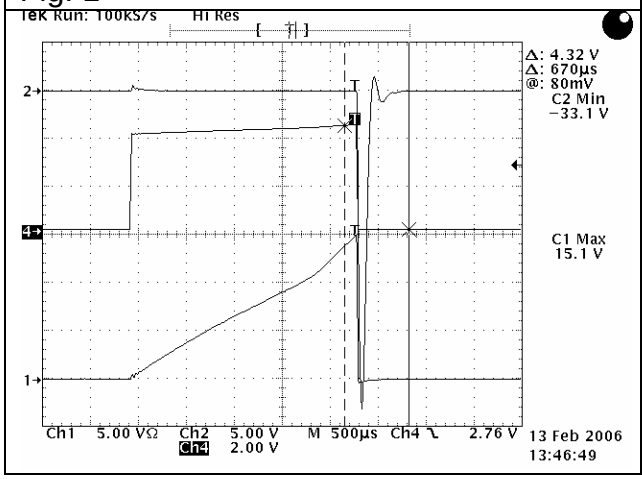
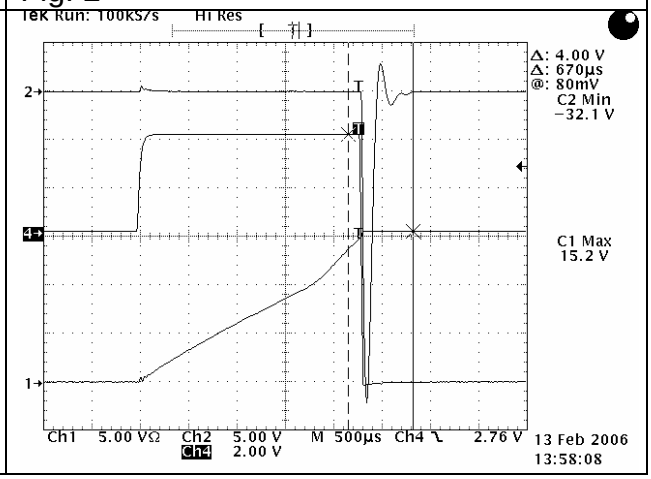


Fig. 2



The X-ray, show the burned area on the electronic and the soldering residual, photo 8.
Photo 9, show the pcb burned.

Photo 8

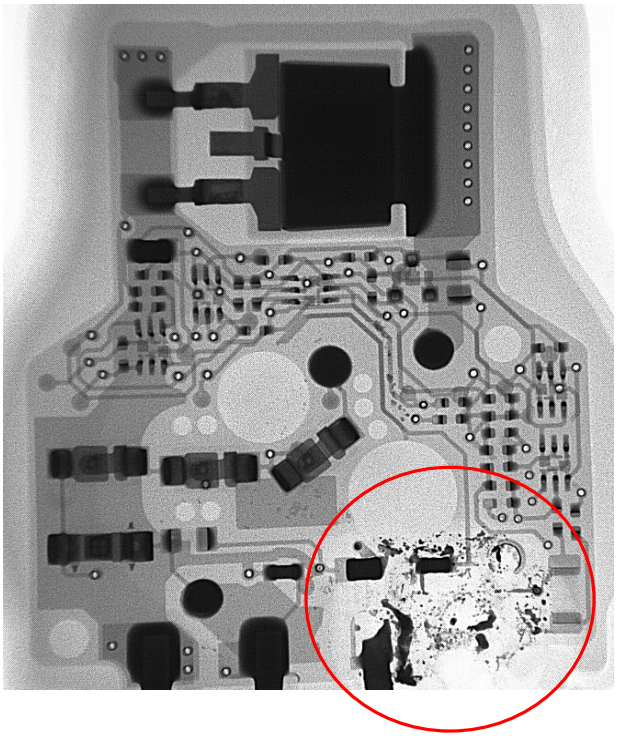
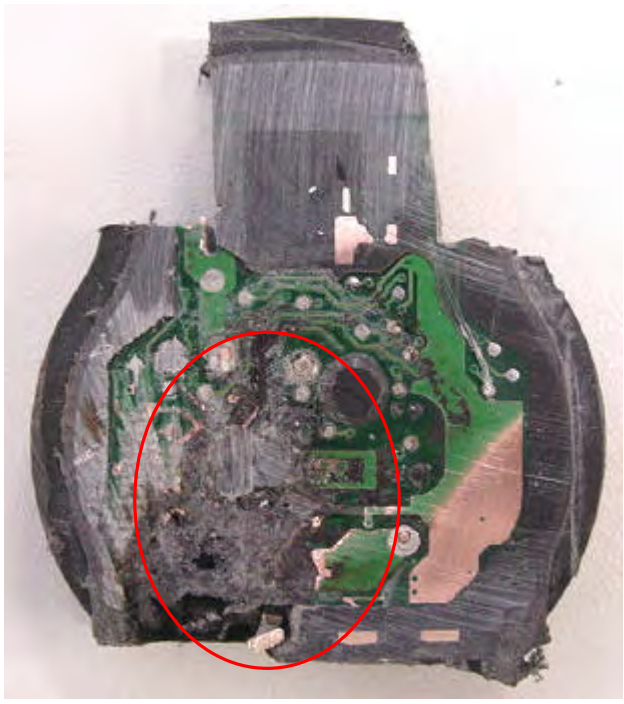
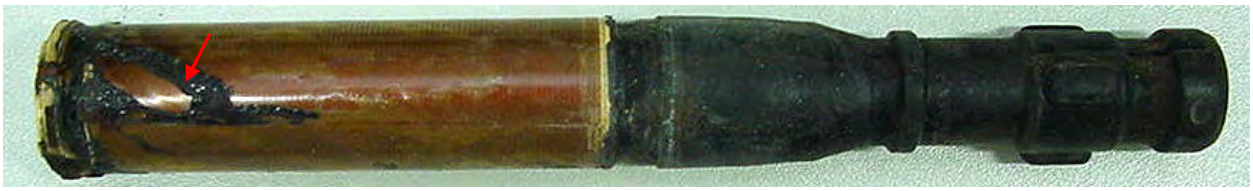


Photo 9



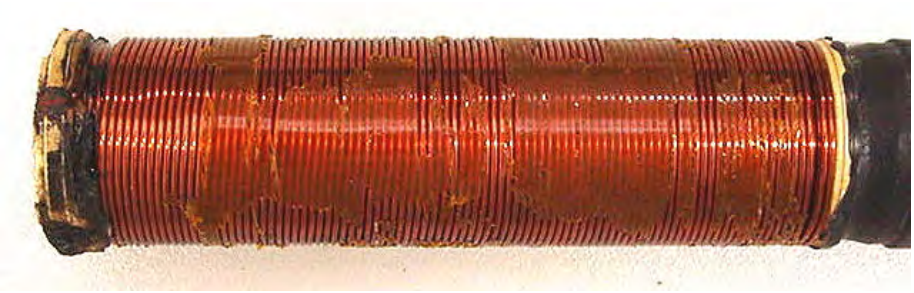
Not discharge point are observed, photo 10.
In LV area is visible the primary coil former burned. The primary winding is not damaged.

Photo 10



In the coil was removed the plastic tape for to check the integrity of the primary windings, photo 11. The windings appear in good condition.

Photo 11



No contact point were observed in the external (photo 12) and internal (photo 13) surface of the shield. On the surface of the shield it was observed the oxidation.

Photo 12

Photo 13

No discharge point were observed in the surface of the long shield, photo 13. There is the oxidation residual coming from the internal shield.

Photo 13

	Defect in the winding
	Defect in electronic
X	**Other**

E) DEFECT

Failure analysis data :

- Windings work normally.
- Igbt work normally.
- Electronic not again available for further analysis because to much burned.
- No discharge point observed between the primary windings and the shield.
- Oxidation present on the surface of the shield.

For the present residual of unknown material on the surface of the long shield we suggest the customer to check the possible material present on the engine that can moved on the pencil coil.

Therefore, in our opinion there was probably humidity penetration on the shield that has determined the oxidation of the internal metal shield.

Failure cause hypothesis:

1) Probably humidity penetration on the pcb that has determined the burning of the electronic.
2) Soldering residuals present between the pin 1 and 2 .
3) Misalignment between the cover of the engine and engine that can determine a wrong contact between the head rubber and the cover and the permits humidity and dust penetration in the plug well.

5) CORRECTIVE ACTIONS

For humidity penetration:

Change of the head rubber in order to guarantee a better sealing between the plug well and the ambient area in all tolerances condition -> in wk 04/06.

For soldering residuals:

Starting from week 06/06 (09/02/2006) will be inserted in the production line 2 the completely automatic washing of the pcb to remove eventual soldering material coming from the soldering phase.

We suggest the customer to check the possible misalignment between the engine and the cover which contain the head rubber, in order to be sure that the head rubber work in good mode and guarantee the perfect sealing between the plug well and the engine ambient.

6) CORRECTIVE ACTIONS IMPLEMENTATION

New FSI pencil coil Gen II with primary potted -> in wk 35/06.

7) PREVENT THE RECURRENCE

See point 5.

8) TEAM CONGRATULATION

Not applied.

FAILURE ANALYSIS REPORT

DATE: 20/02/2006	**N.:** R060006R005	**TOTAL NUMBER OF PAGES:** 6
FROM: Piras A. Automotive		DEPT: AUTOMOTIVE DIRECT FAX: DIRECT PHONE:
TO: Mr. Giere - VW		ATTN: DEPT: FAX:
INT. COPY: Santagata G. / Spataro G. / Croci A. / Mottola M.		EXT. COPY:
SUBJECT: FAILURE ANALYSIS REPORT		

Issued by :	Piras A.
Checked by :	Santagata G.

1) TEAM

Team is composed by: Santagata G./ Piras A.

2) PROBLEM DESCRIPTION AND DATA

Eldor product code	78230005
Eldor data code or reference	21F6 III 4 15/05
Customer reference	11-2006.01.23-F-014
RMA	84001346
Arrival data	31/01/2006
Origin of the part and people reference	Volkswagen – Mr. Giere
Part coming from ? Field, Factory, Motor Test, etc.	Field
Engine used	3vwrf31y36m305345
How much km/h/cycle?	500 Km
Customer defect	Flüssigkeitsrückstände am Rückschlußblech, Spulenkopf abgebrochen, thermische Überlastung

3) CONTAINMENT ACTIONS

None

4) ROOT CAUSES:

A) VISUAL INSPECTION

The coil was received in Eldor in this condition, photo 1.
The head is detached from the windings.

Photo 1

Photo 2, show the zoom of the unknown material present on the long shield.
Follow, the material has been scratched from the surface of the long shield, photo 3. Not residual remaining on the surface. So no oxidation observed.

Photo 2

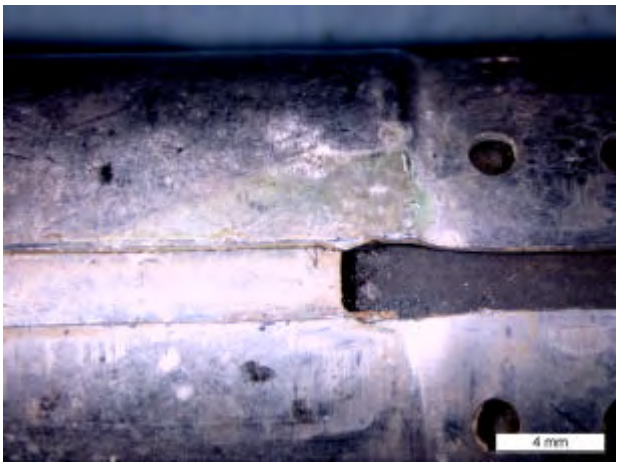
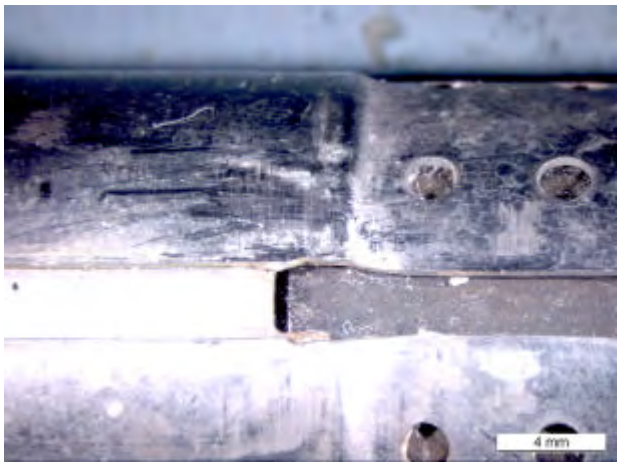


Photo 3



B) ELECTRICAL TEST

The pencil coil was electrically verified in Eldor in the follow condition Vbatt =14V @ IP=0A; Freq.= 50Hz; IP = 15A; Load 1M//25pF.
It was not possible to check the pencil electrically.

C) PRELIMINARY X-RAY

The X-ray show the electronic very damaged (photo 4) and the windings very melted (photo 5).

Photo 4

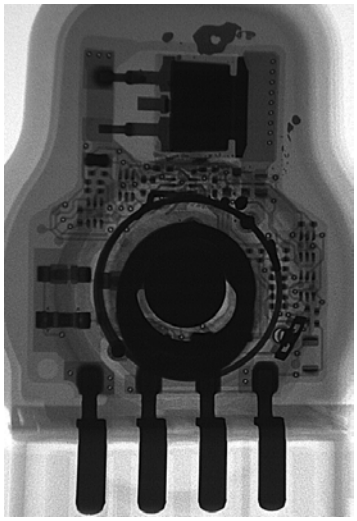


Photo 5

D) ANALYSIS OF WINDINGS AND ELECTRONIC

The electronic was checked with a sure good windings: KO, fig.1.

The X-ray, show the soldering melted present on the pcb, photo 6.

Fig. 1

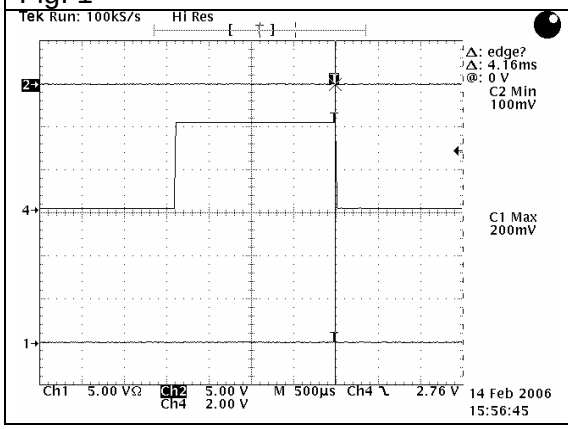
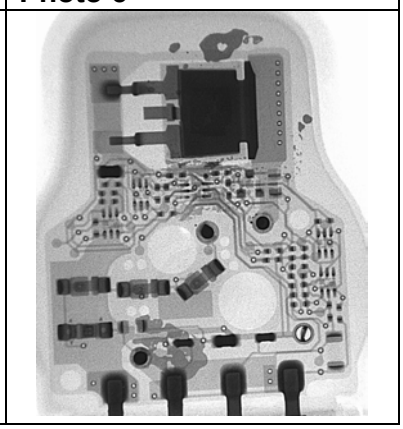


Photo 6



The Igbt was extract from the pcb and checked it in a sure good electronic and windings: KO, fig. 2.

So also the electronic were tested with a sure good Igbt and windings: KO, fig. 3.

Fig. 2

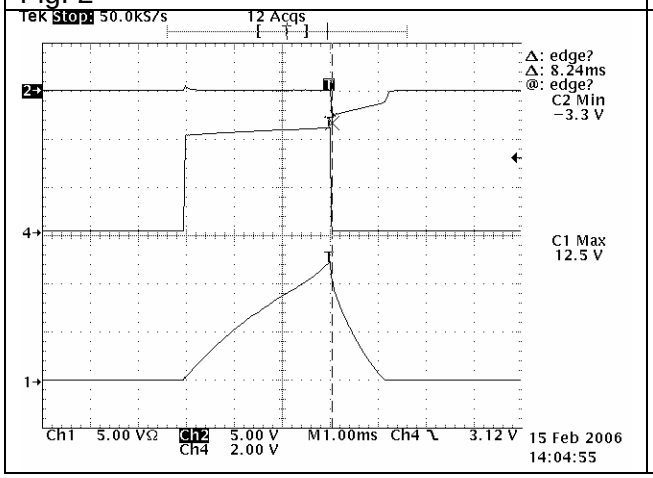
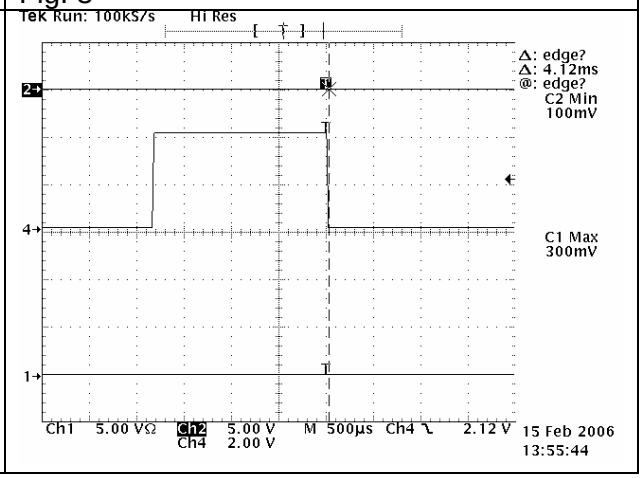


Fig. 3



Measurement of the IGBT damaged :

Rcg = 2,07 Kohm;

Rce = 5,35 Kohm;

Reg = 3,41 Kohm;

Photo 7, show the pcb after the cut of the Igbt and the removed of the soldering residual on bottom side.

The X-ray, show the soldering melted area present on the top side, photo 8.

Photo 7

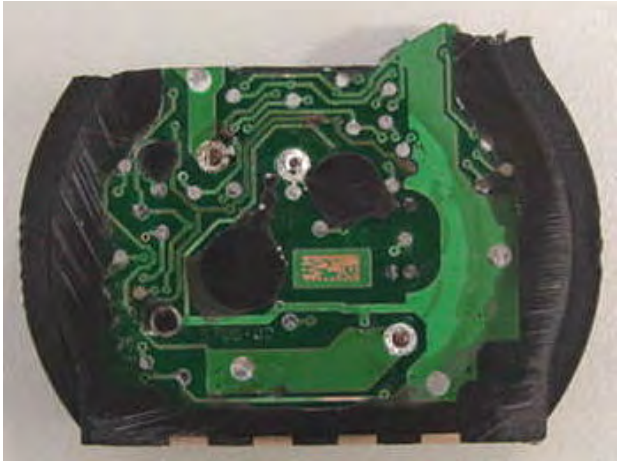


Photo 8

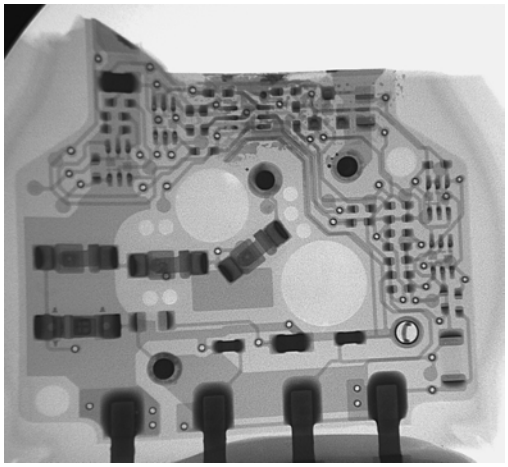


Photo 9, show the discharge between the V batt track and V input signal track.
Photo 10, show the discharge between the V batt track and the gnd contact track.

Photo 9

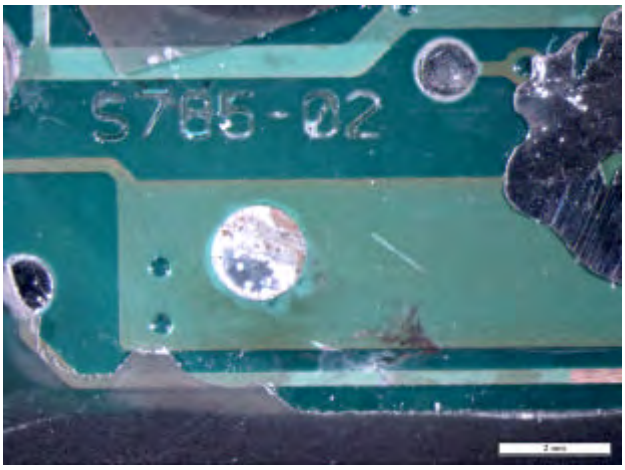
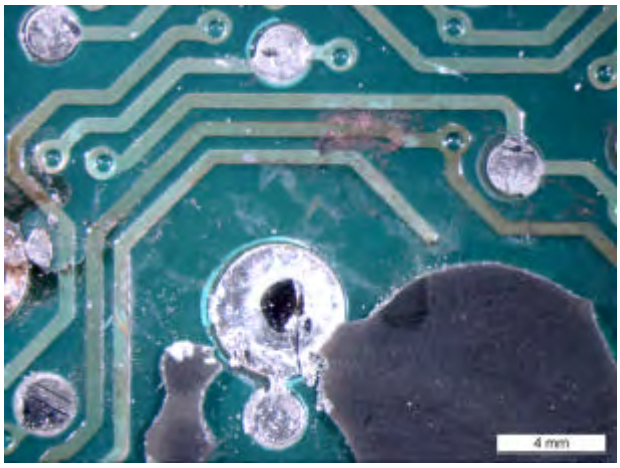


Photo 10



Follow in the electronic was measured some Tp :
Fig. 4, show the input signal of the differential circuit (Tp 13) : incorrect signal;
Fig. 5, show the output signal of the differential circuit (Tp 24) : absent signal;
Fig. 6, show the signal gate of the Igbt (Tp 20) : absent signal;
Fig. 7, show the signal of zener (Tp 16) : absent signal;

Fig. 4

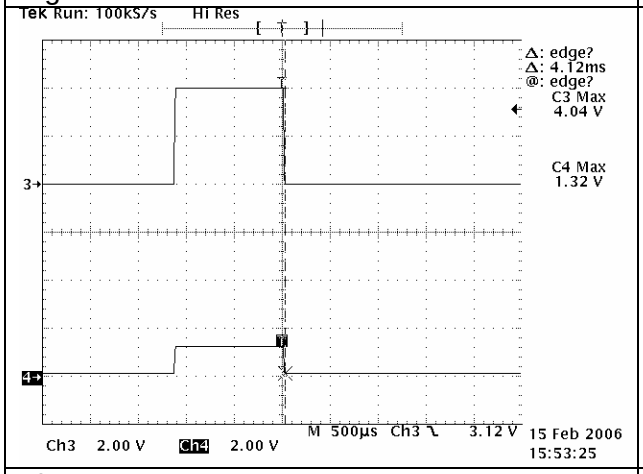


Fig. 5

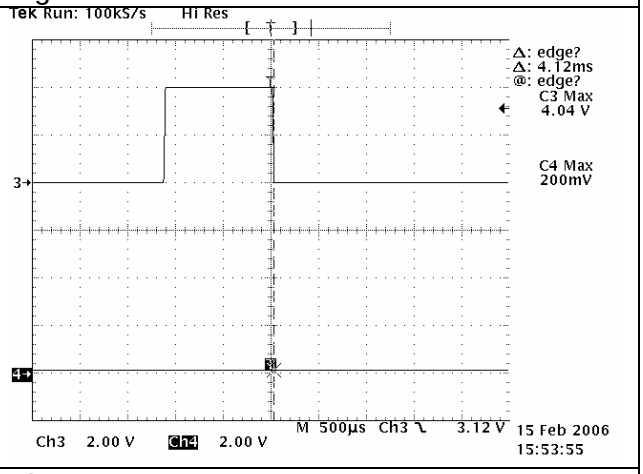


Fig. 6

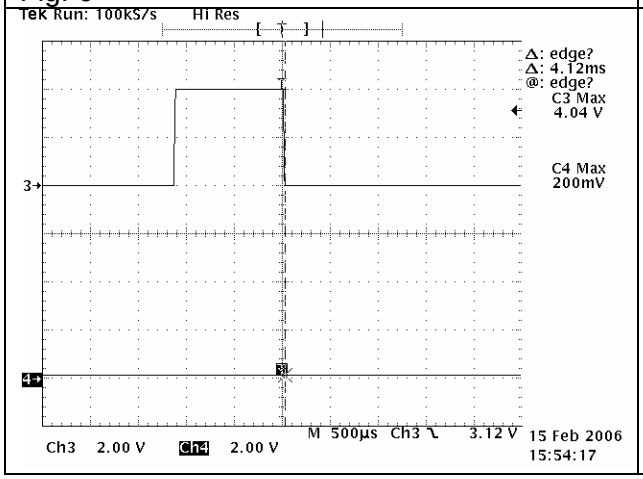
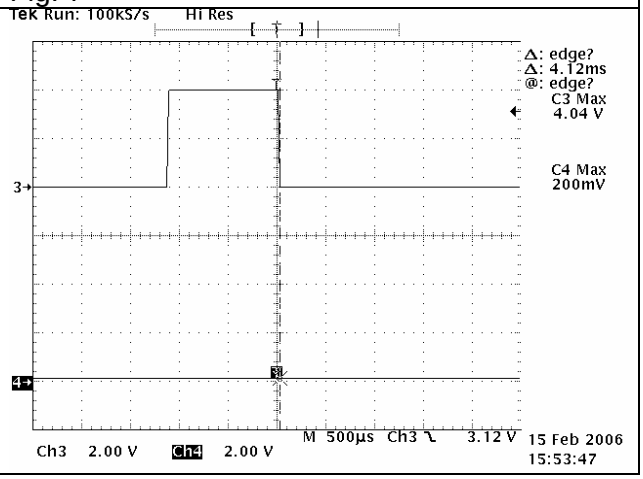


Fig. 7



The pcb resulted too much damaged at the soldering melted for further analysis.

The primary windings appear very damaged, the primary plastic is melted for the excessive heating due to the high temperature reached by the primary wire, photo 11.

Photo 11

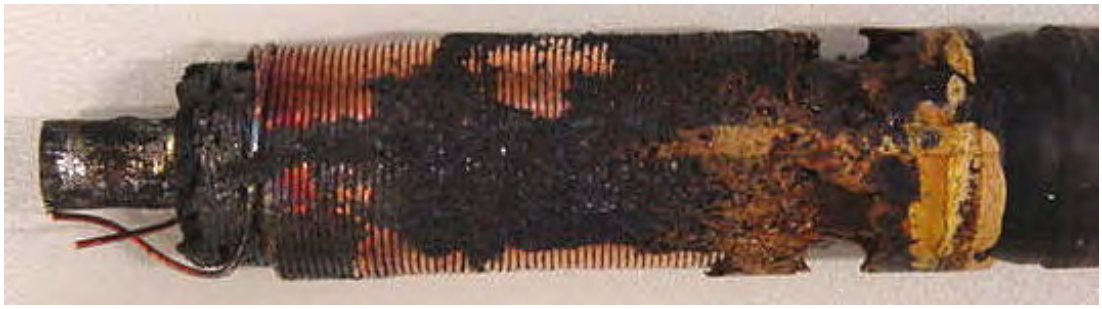


Photo 12, show the internal of the shield with plastic residual due to the melting of the primary coil former;
Photo 13, show the external of the shield that it appear very overheat.

Photo 12

Photo 13

The long shield appear overheat for the excessive heating due to the high temperature reached by the coil, photo 14.

Photo 14

	Defect in the winding
	Defect in electronic
X	**Other**

E) DEFECT

Failure analysis data :

- Windings melted.
- Igbt damaged.
- Electronic damaged.

For the present residual of unknown material on the surface of the long shield we suggest the customer to check the possible material present on the engine that can moved on the pencil coil.

Failure cause hypothesis:

1) Probably humidity penetration on the pcb that has determined the bad function of the electronic.
2) Misalignment between the cover of the engine and engine that can determine a wrong contact between the head rubber and the cover and the permits humidity and dust penetration in the plug well.

5) CORRECTIVE ACTIONS

For humidity penetration:

Change of the head rubber in order to guarantee a better sealing between the plug well and the ambient area in all tolerances condition -> in wk 04/06.

We suggest the customer to check the possible misalignment between the engine and the cover which contain the head rubber, in order to be sure that the head rubber work in good mode and guarantee the perfect sealing between the plug well and the engine ambient.

6) CORRECTIVE ACTIONS IMPLEMENTATION

New FSI pencil coil Gen II with primary potted -> in wk 35/06.

7) PREVENT THE RECURRENCE

See point 5.

8) TEAM CONGRATULATION

Not applied.

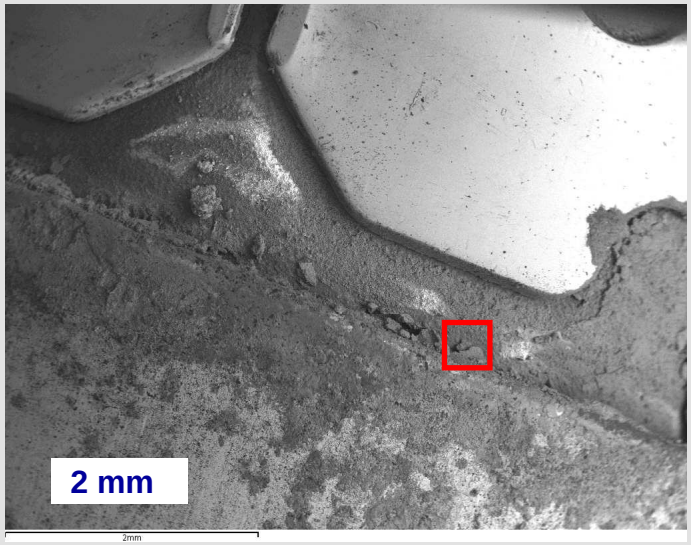
Schadhafte Stabzündspule aus USA (11-Z-06-1054)

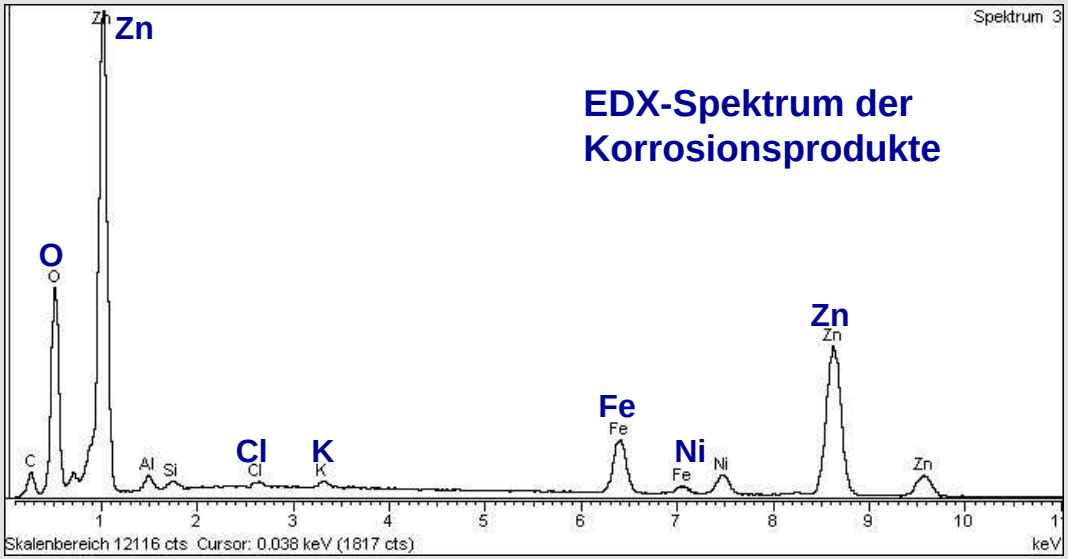
Teile.Nr: 022.905.100.T

Korrodierte Stabzündspule im 3.6l-VR6-FSI Passat nach 850 mls LL

Analyse der Korrosionsprodukte:

Bei den Korrosionsprodukten handelt es sich im wesentlichen um oxidische Zinkverbindungen mit Spuren von Cl und K. Tensidische Elemente (P, Na), die auf Reinigungsmittel hinweisen, wurden nicht gefunden.





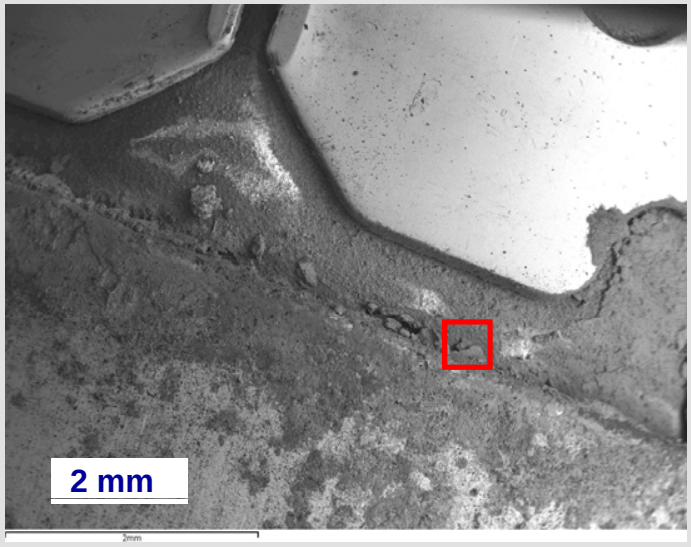
Faulty ignition coil from USA (11-Z-06-1054)

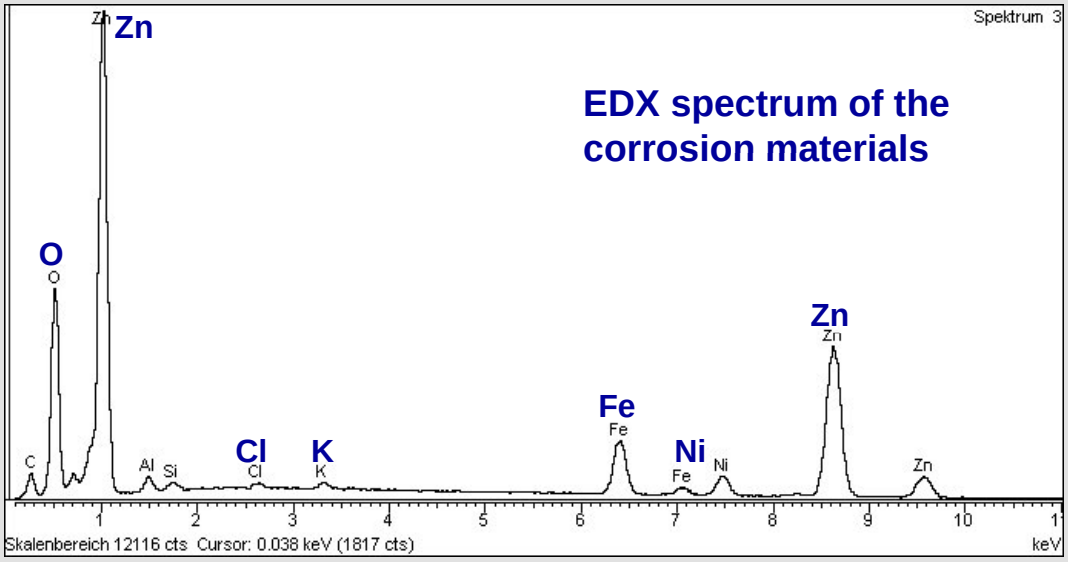
Part no: 022.905.100.T

Corroded ignition coil in the 3.6l VR6 FSI Passat after 850 mls LL

Analysis of the corrosion material:

The corrosion material is essentially oxidic zinc compounds with traces of Cl and K. Tensidic elements (P, Na) that would suggest a cleaner were not found.





EDX spectrum of the corrosion materials

FAILURE ANALYSIS REPORT

DATE: 16/05/2006	**N.:** R060043R002	**TOTAL NUMBER OF PAGES:** 5
FROM: Piras A. Automotive		DEPT: AUTOMOTIVE DIRECT FAX: DIRECT PHONE:
TO: Mr. Giere - VW		ATTN: DEPT: FAX:
INT. COPY: Santagata G. / Spataro G. / Forte B./ Croci A.		EXT. COPY:
SUBJECT: FAILURE ANALYSIS REPORT		

Issued by :	Piras A.
Checked by :	Santagata G.

1) TEAM

Team is composed by: Santagata G./ Piras A.

2) PROBLEM DESCRIPTION AND DATA

Eldor product code	78230005
Eldor data code or reference	02F1 III 1 16/05
Customer reference	11-2006.03.27-f-021
RMA	84001396
Arrival data	11/04/2006
Origin of the part and people reference	Volkswagen – Mr. Giere
Part coming from ? Field, Factory, Motor Test, etc.	Field
How much km/h/cycle?	1000 Km
Engine used	3VWPF71K26M652000
Customer defect	Feuchtigkeitsrückstände am Blech, Kurzschluss ->ZL-> Eldor

3) CONTAINMENT ACTIONS

None

4) ROOT CAUSES:

A) VISUAL INSPECTION

Not damaged are present on the external surface of the coil, photo 1.

In the surface of the long shield there is a unknown material, we suppose that this material coming from the motor plug well.

Photo 1

Photo 2, show the zoom of the unknown material on the surface of the long shield.

Follow, the material has been scratched of the surface from long shield. Not residual remaining of the material in the surface. The residual was not coming from the external surface of the coil.

Photo 3, show the long shield clean, after the removing of the unknown material.

Photo 2

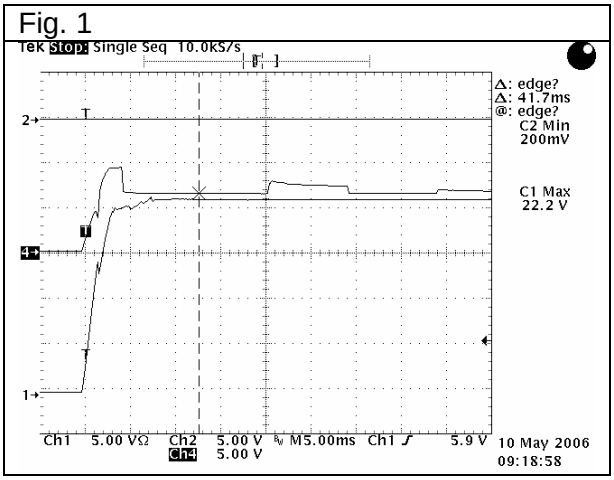
Photo 3

B) ELECTRICAL TEST

The pencil coil was electrically verified in Eldor in the follow condition Vbatt =14V @ IP=0A; Freq.= 50Hz; IP = 15A; Load 1M//25pF.

The coil don't work, fig. 1.

Fig. 1



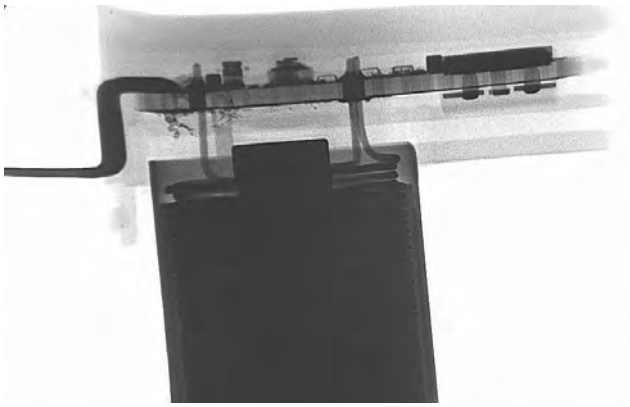
C) PRELIMINARY X-RAY

The X-ray, show the pencil very damaged, photo 4.

Is present some soldering material due to the high temperature reach by the pcb in pin1 area, photo 5.

Photo 4

Photo 5



D) ANALYSIS OF WINDINGS AND ELECTRONIC

The Igbt was checked with a sure good electronic and windings: Ok, fig. 2.

The windings were tested with a sure good electronic and IGBT: Ok, fig, 3.

Fig. 2

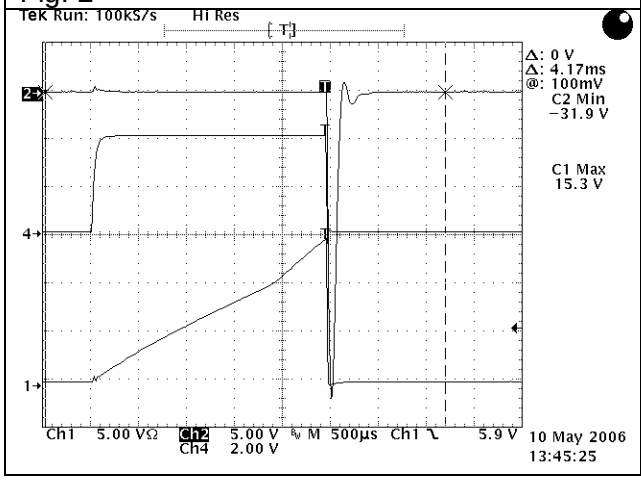
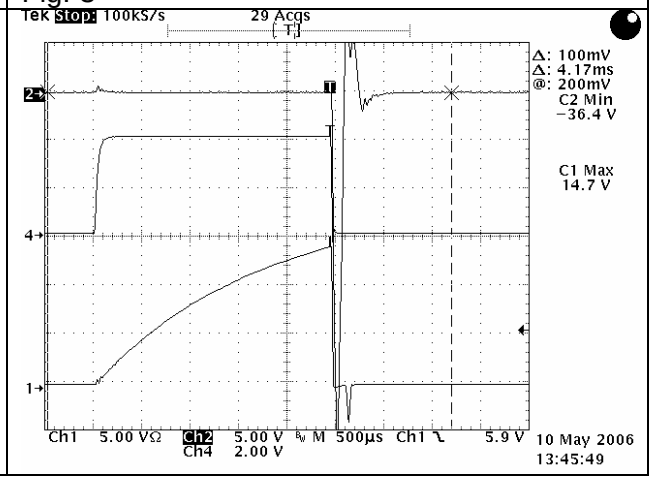


Fig. 3



The X-ray, show the damaged area on the electronic, photo 6.

Photo 7, show the burn area on the bottom side of the pcb.

Photo 6

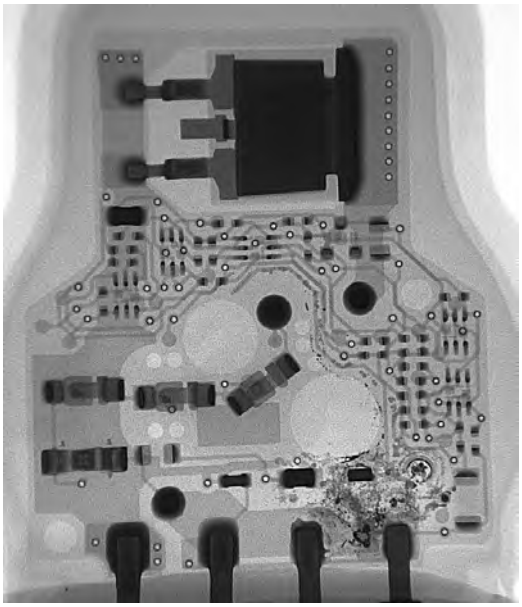


Photo 7

The long shield was extract from the pencil for to check the primary windings : the plastic tape results damaged, but not contact point are observed between the primary wire and the shield, photo 8.

Photo 8

On the external surface of the shield it was observed the oxidation, see photo 9.
On the internal surface of the shield it was observed the oxidation, photo 10.
No contact point were observed in the surface of the shield.

Photo 9

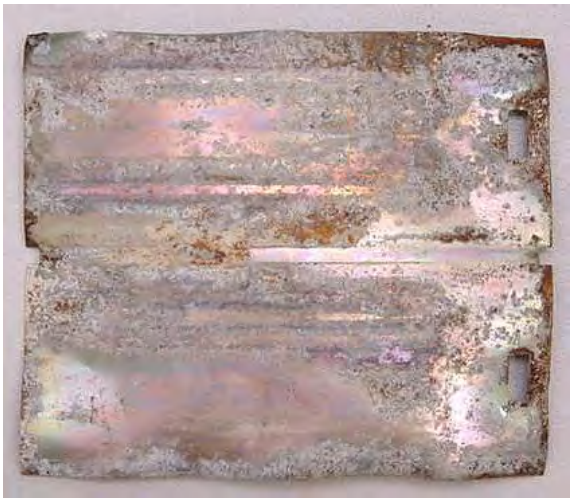


Photo 10

On the internal long shield there is the oxidation residual coming from the internal shield, see photo 11.

Photo 11

E) DEFECT
Failure analysis data :

- Windings work normally.
- Igbt work normally.
- Electronic not again available for further analysis because to much burned.
- No discharge point observed between the primary windings and the shield.
- Oxidation was observed on the surface of the shield.

Failure cause hypothesis:
Probably humidity penetration on the pcb that has determined the burning of the electronic.

5) CORRECTIVE ACTIONS
For humidity penetration:
Change of the head rubber in order to guarantee a better sealing between the plug well and the ambient area in all tolerances condition -> in wk 04/06.

6) CORRECTIVE ACTIONS IMPLEMENTATION
New FSI pencil coil Gen II with primary potted -> in wk 35/06.

7) PREVENT THE RECURRENCE
See point 5.

8) TEAM CONGRATULATION
Not applied.

Audi
Quality assurance

Test Report FIELD

Complaint number	*Entry date*	*Factory*	*Complaint location*
000248715	14.11.2006	21	USA

Damage part	07K 905 715	Ignition coil
Delivered part	07K 905 715	Ignition coil
Supplier	00075042 00	PULSE CORPORATION S.P.A. ORSENIGO
		VIA CAIO PLINIO 18 22030 ORSENIGO, ITALY

FSN ***Dept.*** ***Telephone***

Parts manager

Damage assessor

SAGA code

Make	*Prod. daught.*	*ISO*	*DC*	*Partner*	*Task no.*	*Serial no. application date*
A	0200	USA	444	02A16	75322A	01

VIN	*Replacement part*	*Damage type BD*
WAUMF78P46A019449	07K 905 715	0040 0

Vehicle type	*Km reading*	*Delivery date*	*Repair date*	*Control data*
8PA52X	11.000	30.12.2005	30.06.2006	110

Service no. 2820 ignition coil ***Type of damage*** 0040

No. of complaint items	*No. of work items*	*Part manufacture date*	*Comment*
4,00	4,00	16.05.2005	

Complaint text

Complaint code	*Complaint code text*
SA040	Electrical fault

Fault code	*Fault code text*
MM105	Component overloaded / corrosion visible on component

Originator	*Comment*	*From VIN*
Not determinable		

QTS status	*Delivery status*	*Completion indicator*	*In usage date*
2 12.12.2006	12.12.2006		

Test report no.	*Costs to be borne by*	*No. of cost items*
	AUDI 21 6506	4,00

Cause/Action

VA 21503995, 15.11.06.
1x MM105, 3x okay

Audi
Quality assurance

Test Report FIELD

Complaint number	*Entry date*	*Factory*	*Complaint location*
0002484263	16.11.2006	21	Distribution center

Damage part 06B 905 115 M Ignition coil
Delivered part 06B 905 115 M Ignition coil
Supplier 00001542 00 PULSE POWERTRAIN GMBH&CO.KG MEINERZHAGEN
AM ROTTLAND 12 58540 MEINERZHAGEN,GERMANY

FSN *Dept.* *Telephone*

Parts manager
Damage assessor

SAGA code

Make	*Prod. daught.*	*ISO*	*DC*	*Partner*	*Task no.*	*Serial no. application date*
A	0200	USA	444	08B13	43637A	01

VIN	*Replacement part*	*Damage type BD*
WAULC68E34A232368	06B 905 115 R	0010 0

Vehicle type	*Km reading*	*Delivery date*	*Repair date*	*Control data*
8E252Z	64.000	31.08.2004	27.10.2006	110

Service no. 2820 ignition coil *Type of damage* 0010

No. of complaint items	*No. of work items*	*Part manufacture date*	*Comment*
4,00	4,00	04.03.2004	17.12.2006

Complaint text

Complaint code *Complaint code text*

Fault code *Fault code text*
MM105 Component overloaded / corrosion visible on component

Originator *Comment* *From VIN*
Supplier

QTS status	*Delivery status*	*Completion indicator*	*In usage date*
2 15.01.2007	15.01.2007		

Test report no.	*Costs to be borne by*	*No. of cost items*
06671182	supplier 00001542 00	4,00

Cause/Action

Audi
Quality assurance

Test Report FIELD

Complaint number	*Entry date*	*Factory*	*Complaint location*
0002665668	31.05.2007	38	USA

Damage part 06B 905 115 N Ignition coil
Delivered part 06B 905 115 N Ignition coil
Supplier 00001542 00 PULSE POWERTRAIN GMBH&CO.KG MEINERZHAGEN
AM ROTTLAND 12I 58540 MEINERZHAGEN, GERMANY

FSN	*Dept.*	*Telephone*

Parts manager
Damage assessor

SAGA code

Make	*Prod. daught.*	*ISO*	*DC*	*Partner*	*Task no.*	*Serial no. application date*
A	0200	USA	444	08B32	75091A	01

VIN	*Replacement part*	*Damage type BD*
WAUAC48H66K004044	06B 905 115 R	0040 0

Vehicle type	*Km reading*	*Delivery date*	*Repair date*	*Control data*
8H752H	22.000	31.12.2005	06.04.2007	110

Service no. 2820 ignition coil ***Type of damage*** 0040

No. of complaint items	*No. of work items*	*Part manufacture date*	*Comment*
1,00	1,00	29.06.2005	12.07.2007

Complaint text

Complaint code	*Complaint code text*
SA040	Electical fault

Fault code	*Fault code text*
MM105	Component overloaded / corrosion visible on part

Originator	*Comment*	*From VIN*
Not determinable		

QTS status	*Delivery status*	*Completion indicator*	*In usage date*
3 12.06.2007	12.06.2007		

Test report no.	*Costs to be borne by*	*No. of cost items*
	AUDI 21 6506	1,00

Cause/Action
3 parts corroded, 1x thermically overloaded
Action by technology R2, from KW 16/06

FAILURE ANALYSIS REPORT

DATE: 12/07/2007	**N.:** R070177R001	**TOTAL NUMBER OF PAGES:** 3
FROM: Piras A. Automotive		DEPT: AUTOMOTIVE DIRECT FAX: DIRECT PHONE:
TO: Mr. Giere - VW		ATTN: DEPT: FAX:
INT. COPY: Santagata G. / Crotti V. / Forte B. / Croci A.		EXT. COPY:
SUBJECT: FAILURE ANALYSIS REPORT		

Issued by :	Piras A.
Checked by :	Crotti V.

1) TEAM

Team is composed by: Santagata G. / Piras A. / Crotti V.

2) PROBLEM DESCRIPTION

Eldor product code	78412001
Customer product code	022 905 715
Eldor data code or reference	03F3 I 2 49/06
Customer reference	11-2007.06.14-f-053
RMA	84001770
Arrival data	11/07/2007
Origin of the part and people reference	Volkswagen – Mr. Giere
Part coming from ? Field, Factory, Motor Test, etc.	Field
How much km/h/cycle?	249 Km
Engine used	WVWDB71F07V031107
Customer defect	Feuchtigkeit am inneren Blech;Zylinder 4;Kopf ist abgebrannt,Draht ist n.i.O,bei RT niO

3) CONTAINMENT ACTIONS

4) ROOT CAUSES

A) VISUAL INSPECTION

The coil received is very burnt, photo 1.

Photo 1

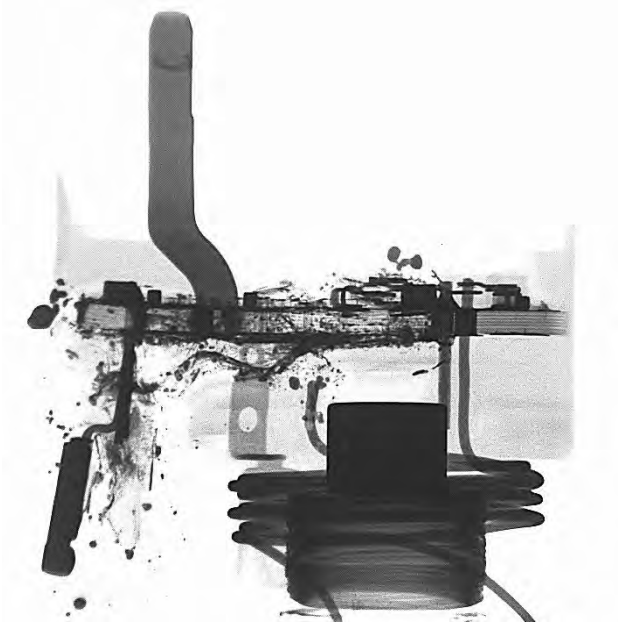
B) ELECTRICAL TEST

It was not possible to check electrical the coil.

C) X-RAY INSPECTION

The X-ray, show the part of the coil melted, photo 2.

Photo 2



D) ANALYSIS OF WINDINGS AND ELECTRONIC

PCB analysis :

Electronic very burnt, photo 3, 4.

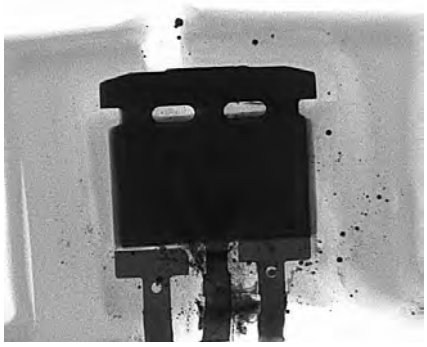
Photo 3

Photo 4

The Igbt is very carbonized, photo 5, 6.

Photo 5

Photo 6



E) DEFECT

Failure analysis data:

- Igbt burnt.
- Windings melted.
- Electronic burnt.

The level of burnt is too much high, not possible further analysis.

5) CORRECTIVE ACTIONS

Not applicable.

6) CORRECTIVE ACTIONS IMPLEMENTATION

See point 5

7) PREVENT THE RECURRENCE

See point 5.

8) TEAM CONGRATULATION

Not applied.

FAILURE ANALYSIS REPORT

DATE: 26/07/2007	**N.:** R070170R001	**TOTAL NUMBER OF PAGES:** 4
FROM: Piras A. Automotive		DEPT: AUTOMOTIVE DIRECT FAX: DIRECT PHONE:
TO: Mr. Giere - VW		ATTN: DEPT: FAX:
INT. COPY: Santagata G. / Crotti V. / Forte B. / Croci A.		EXT. COPY:
SUBJECT: FAILURE ANALYSIS REPORT		

Issued by :	Piras A.
Checked by :	Crotti V.

1) TEAM

Team is composed by: Santagata G. / Piras A. / Crotti V.

2) PROBLEM DESCRIPTION

Eldor product code	78230008
Customer product code	07K 905 715A
Eldor data code or reference	16F4 III 4 03/06
Customer reference	11-2007.06.14-f-060
RMA	84001763
Arrival data	06/07/2007
Origin of the part and people reference	Volkswagen – Mr. Giere
Part coming from ? Field, Factory, Motor Test, etc.	Field
How much km/h/cycle?	7148 Km
Engine used	3vwwj71k17m036171
Customer defect	Feuchtigkeit am inneren Blech;Kopf ist thermisch zerstört

3) CONTAINMENT ACTIONS

4) ROOT CAUSES

A) VISUAL INSPECTION

The coil is very melted in the head area, photo 1.

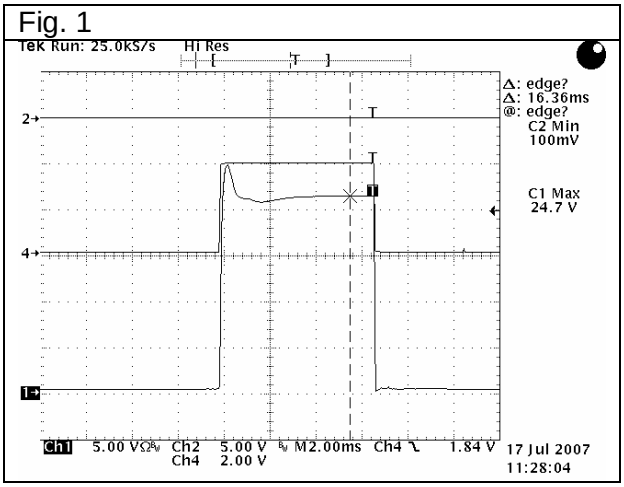
Photo 1

B) ELECTRICAL TEST

The pencil coil has been electrically verified in Eldor in the follow condition Vbatt =14V @ IP=0A; Freq.= 50Hz; IP = 15A; Load 1M//25pF.

The coil don't work, fig. 1.

Fig. 1



C) X-RAY INSPECTION

The X-ray show the pencil coil very melted, photo 2, 3.

Photo 2

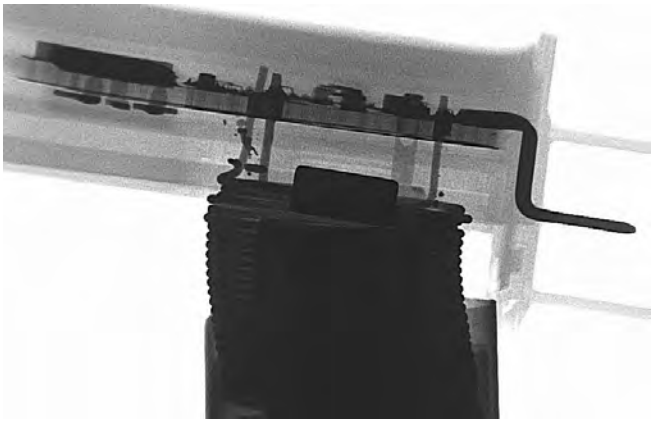
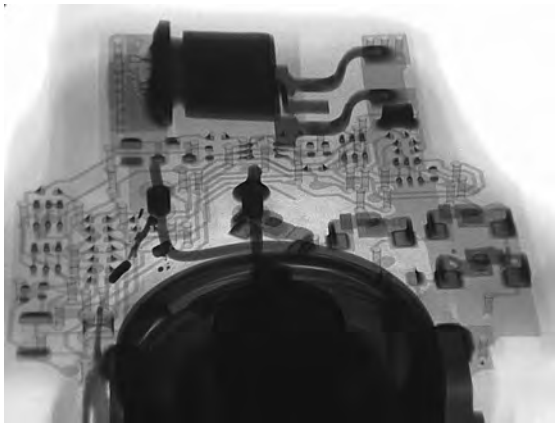


Photo 3



D) ANALYSIS OF WINDINGS AND ELECTRONIC
The pcb has been checked with a sure good windings : OK, fig. 2.
The X-ray, show the pcb very overheated on Igbt area and some soldering melted, photo 4.

Fig. 2

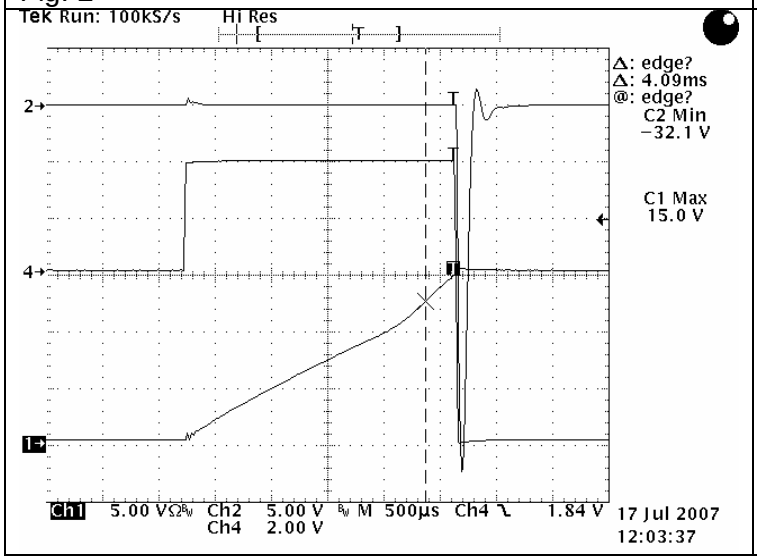
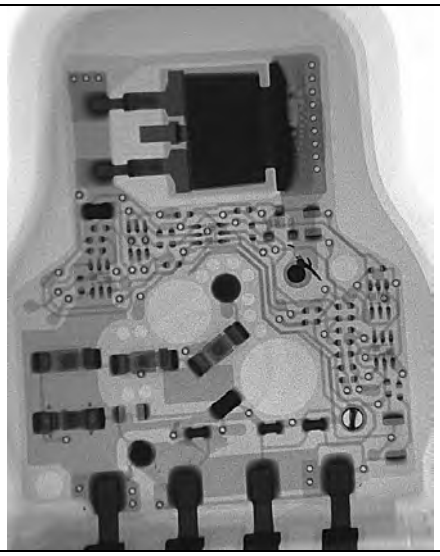


Photo 4



The pcb has been inserted in the climatic room @ 100°C for 1h and electrical checked: OK, fig. 3.
The pcb has been inserted in the climatic room @ -35°C for 1h and electrical checked: OK, fig. 4.

Fig. 3

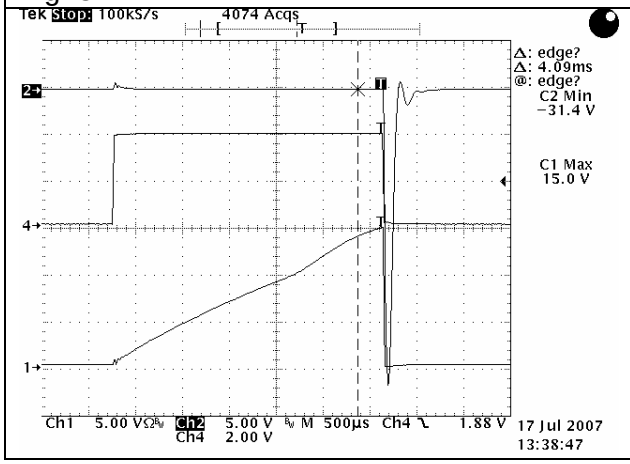
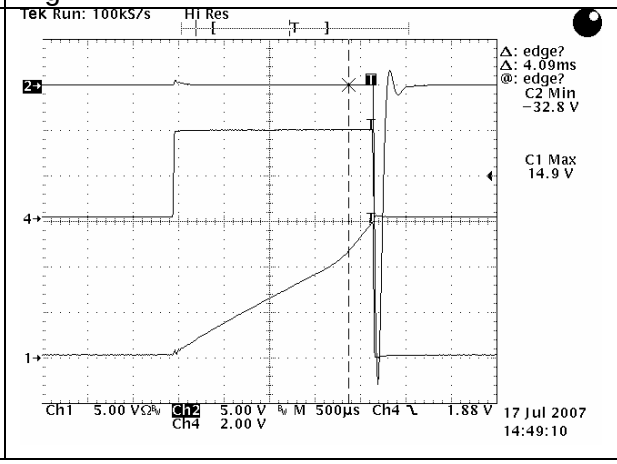


Fig. 4



The windings are carbonized, photo 5.

Photo 5

The surface internal and the external of the shield are carbonized, photo 6, 7.

Photo 6

Photo 7

On the surface of the long shield there is some residual of the carbonized coming from the internal shield, photo 8.

Photo 8

E) DEFECT

Failure analysis data:

- Igbt work OK;
- Electronic work OK;
- Windings carbonised;

Failure cause hypothesis:

- Probably humidity penetration on the pcb that has permitted the driving the IGBT in continuous mode determining the melting of the primary and secondary coil former.

5) CORRECTIVE ACTIONS

Starting in wk 02/07 new FSI pencil coil Gen II with primary potted, that don't permit the humidity penetration.

6) CORRECTIVE ACTIONS IMPLEMENTATION

See point 5.

7) PREVENT THE RECURRENCE

See point 5.

8) TEAM CONGRATULATION

Not applied.

FAILURE ANALYSIS REPORT

DATE: 26/07/2007	**N.:** R070174R001	**TOTAL NUMBER OF PAGES:** 4
FROM: Piras A. Automotive		DEPT: AUTOMOTIVE DIRECT FAX: DIRECT PHONE:
TO: Mr. Giere - VW		ATTN: DEPT: FAX:
INT. COPY: Crotti V. / Santagata G. / Forte B. / Croci A.		EXT. COPY:
SUBJECT: FAILURE ANALYSIS REPORT		

Issued by :	Piras A.
Checked by :	Crotti V.

1) TEAM

Team is composed by: Piras A. / Crotti V. / Santagata G.

2) PROBLEM DESCRIPTION

Eldor product code	78230012
Customer product code	07K 905 715B
Eldor data code or reference	11F4 III 4 17/06
Customer reference	11-2007.06.14-f-059
RMA	84001767
Arrival data	06/07/2007
Origin of the part and people reference	Volkswagen – Mr. Giere
Part coming from ? Field, Factory, Motor Test, etc.	Field
How much km/h/cycle?	37 Km
Engine used	wvwbr71k77w084090
Customer defect	Feuchtigkeit am inneren Blech;Kopf ist thermisch zerstört,bei RT niO

3) CONTAINMENT ACTIONS

4) ROOT CAUSES

A) VISUAL INSPECTION

The coil is very melted, photo 1.

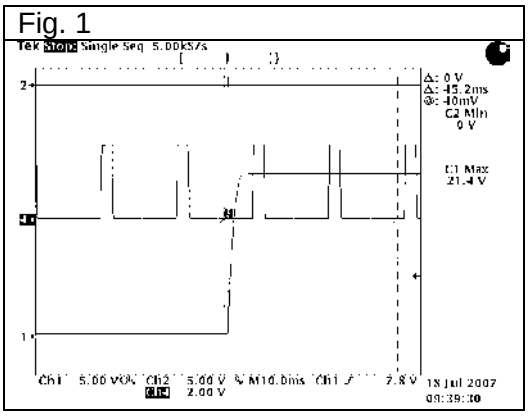
Photo 1

B) ELECTRICAL TEST

The pencil coil has been electrically verified in Eldor in the follow condition Vbatt =14V @ IP=0A; Freq.= 50Hz; IP = 15A; Load 1M//25pF.

The coil don' t work, fig. 1.

Fig. 1



C) X-RAY INSPECTION

The X-ray, show the windings melted (photo 2) and the pcb that in the Igbt area appear damaged(photo 3).

Photo 2

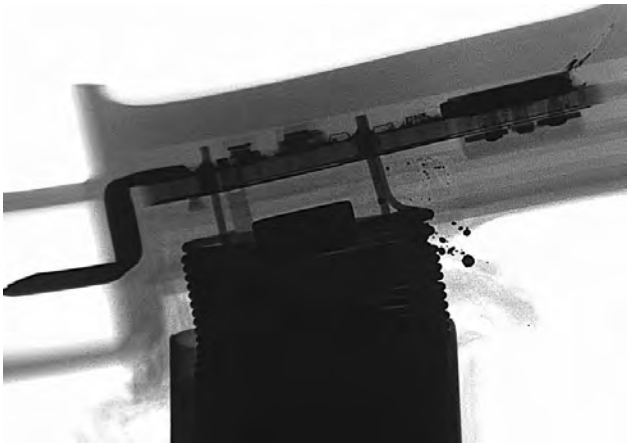
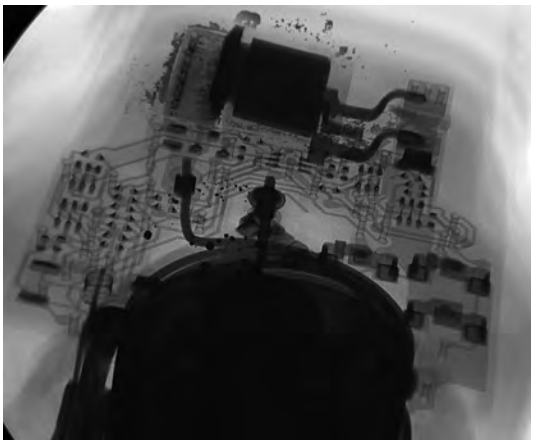


Photo 3



D) ANALYSIS OF WINDINGS AND ELECTRONIC

The pcb has been extracted from the bobbin and electrical checked with a sure good windings: NOT OK, fig. 2.

The X-ray, show the Igbt area damaged on the pcb, photo 4.

Fig. 2

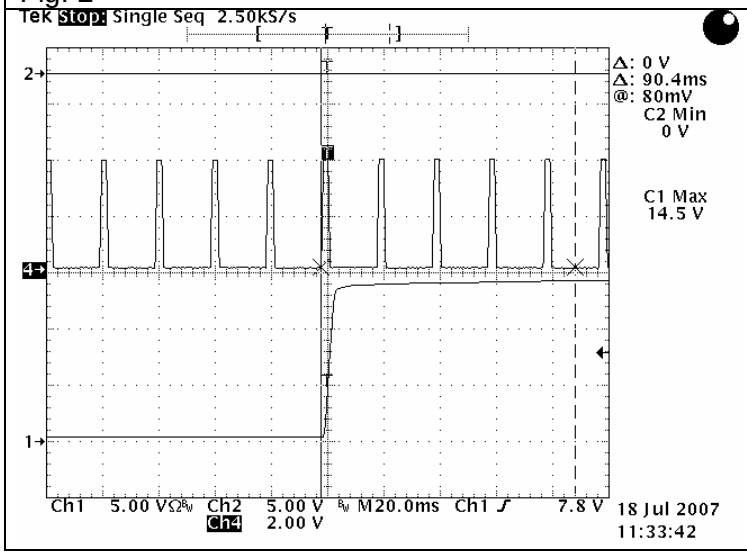
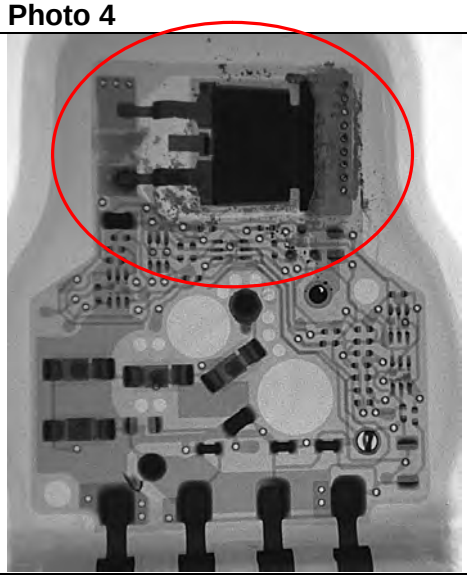


Photo 4



The electronic has been checked with a sure good Igbt and windings : OK, fig. 3.

The Igbt has been checked with a sure good electronic and windings : NOT OK, fig. 4.

Fig. 3

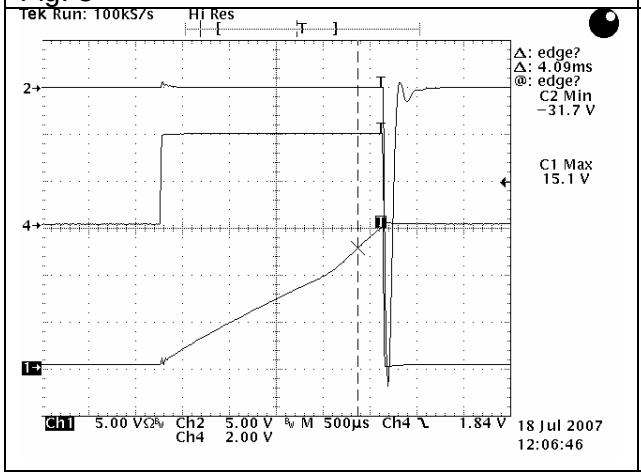
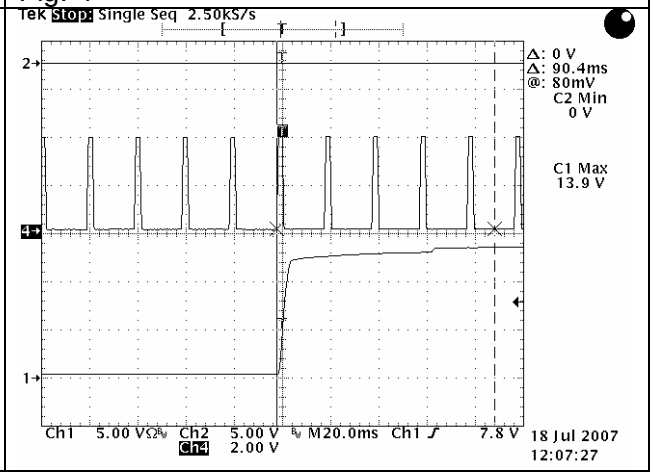


Fig. 4



<u>Resistance measurement of the IGBT:</u>

Rec = 0,68 Ohm.

Rcg = Open.

Rge = 1,57 Ohm.

Result -> IGBT damaged.

The winding are too melted for perform the analysis, photo 5 .

Photo 5

On the internal surface of the shield there are residual of the protection tape melted , photo 6.
The external surface of the shield appear overheated, photo 7.

Photo 6

Photo 7

On the internal surface of the long shield there are some residual of the plastic tape melted coming from the internal shield, photo 8.

Photo 8

E) DEFECT

Failure analysis data:

- Windings melted.
- Electronic OK.
- IGBT not OK.

Failure analysis hypothesis:

A possible root causes is due to a bad electrical behaviour of the Igbt, that has put in driving continuous the coil causing the melting of the windings.

5) CORRECTIVE ACTIONS

Starting in wk 02/07 with the Gen II pencil coil is used the Igbt Gen IV tested with a new differential method and with primary potted.

6) CORRECTIVE ACTIONS IMPLEMENTATION

See point 5

7) PREVENT THE RECURRENCE

See point 5.

8) TEAM CONGRATULATION

Not applied.

FAILURE ANALYSIS REPORT

DATE: 26/07/2007	**N.:** R070180R001	**TOTAL NUMBER OF PAGES:** 5
FROM: Piras A. Automotive		DEPT: AUTOMOTIVE DIRECT FAX: DIRECT PHONE:
TO: Mr. Giere - VW		ATTN: DEPT: FAX:
INT. COPY: Crotti V. / Santagata G. / Forte B. / Croci A.		EXT. COPY:
SUBJECT: FAILURE ANALYSIS REPORT		

Issued by :	Piras A.
Checked by :	Crotti V.

1) TEAM

Team is composed by: Piras A. / Crotti V. / Santagata G.

2) PROBLEM DESCRIPTION

Eldor product code	78230014
Customer product code	07K 905 715C
Eldor data code or reference	05F3 I 2 28/06
Customer reference	11-2007.06.14-f-045
RMA	84001773
Arrival data	06/07/2007
Origin of the part and people reference	Volkswagen – Mr. Giere
Part coming from ? Field, Factory, Motor Test, etc.	Field
How much km/h/cycle?	120 Km
Engine used	wvwbr71k37w119482
Customer defect	Kopf ist geschmolzt und schief,bei RT niO

3) CONTAINMENT ACTIONS

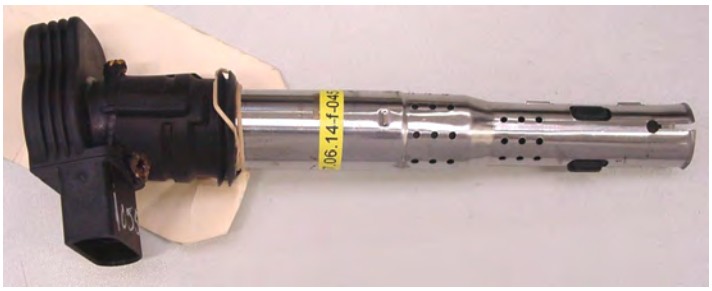
None

4) ROOT CAUSES

A) VISUAL INSPECTION

The coil is very melted in the head area, photo 1.

Photo 1

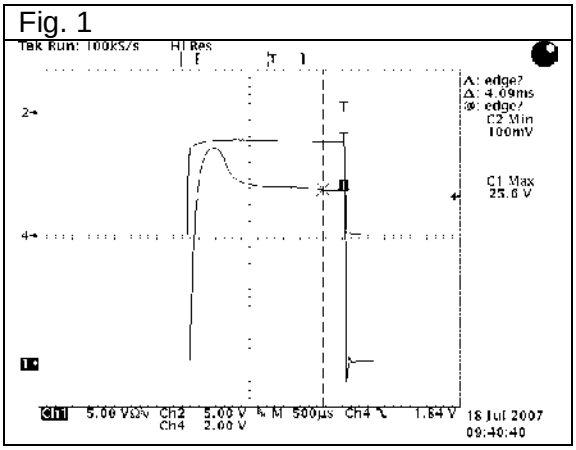


B) ELECTRICAL TEST

The pencil coil has been electrically verified in Eldor in the follow condition Vbatt =14V @ IP=0A; Freq.= 50Hz; IP = 15A; Load 1M//25pF.

The coil don't work, fig. 1.

Fig. 1



C) X-RAY INSPECTION

The X-ray show the windings that appear melted, photo 2, 3.

Photo 2

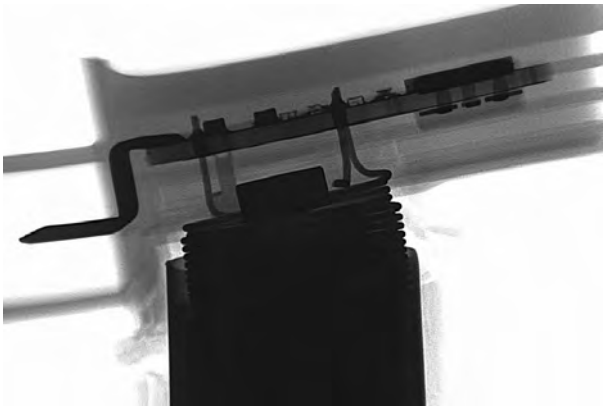
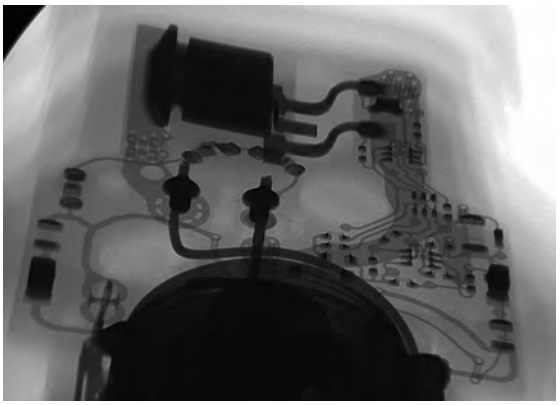


Photo 3



D) ANALYSIS OF WINDINGS AND ELECTRONIC

The pcb has been checked with a sure good windings : OK, fig. 2.

The X-ray, show the pcb in good condition, photo 4.

Fig. 2

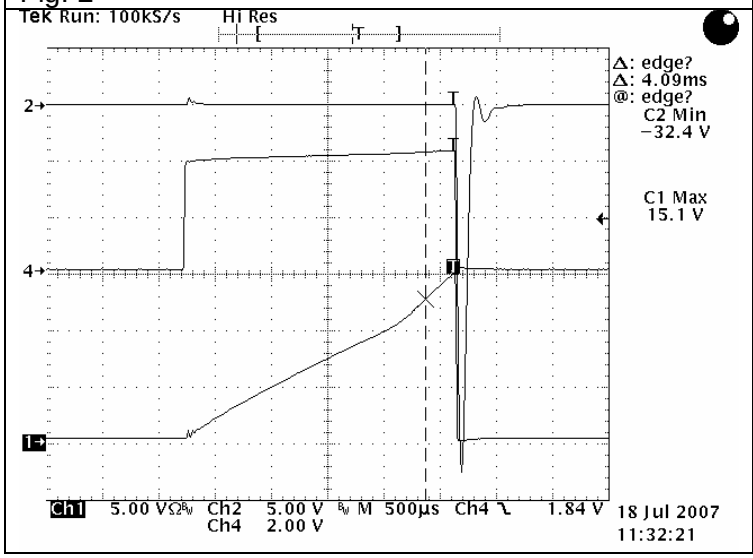
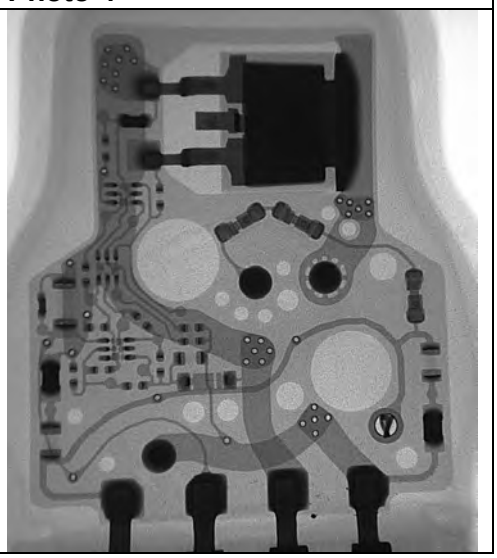


Photo 4



The pcb has been inserted in the climatic room @ 100°C for 1h and electrical checked: OK, fig. 3.

The pcb has been inserted in the climatic room @ -35°C for 1h and electrical checked: OK, fig. 4.

Fig. 3

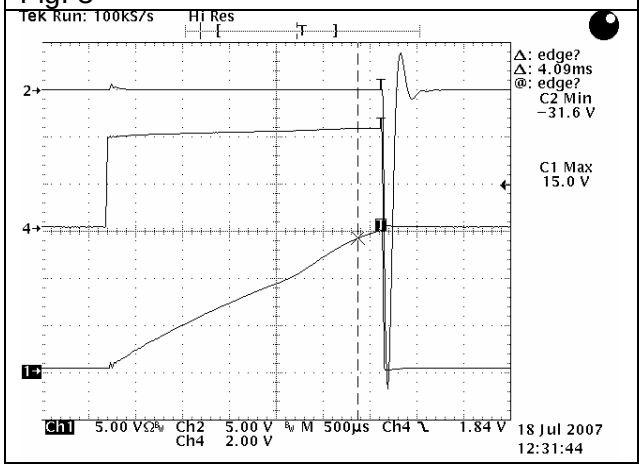
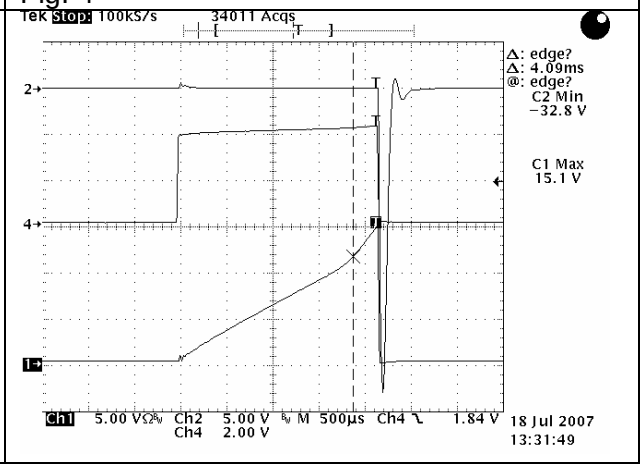
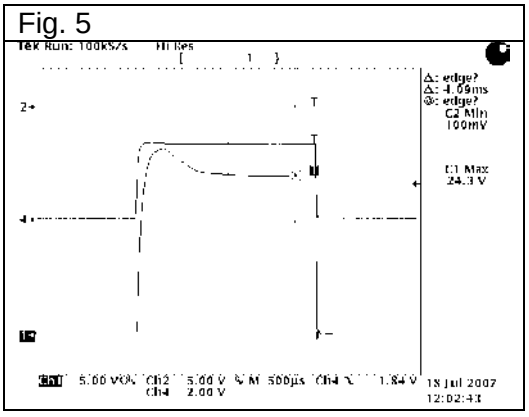


Fig. 4



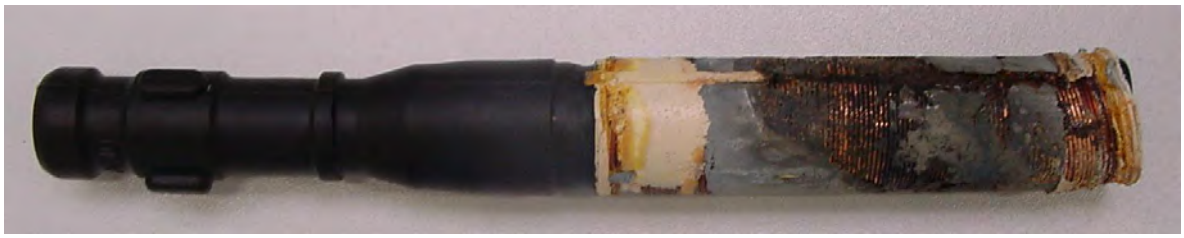
The windings have been checked with a sure good IGBT and electronic: NOT OK, fig. 5.

Fig. 5



The windings are very melted, photo 5.

Photo 5



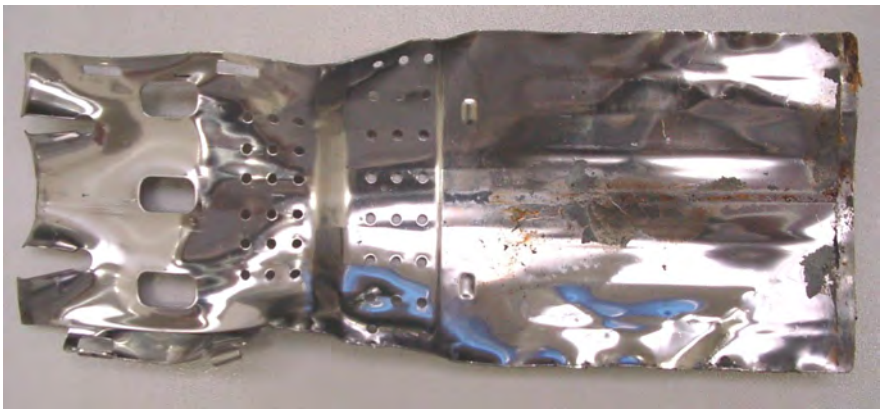
On the internal surface of the shield there are residual of the protection tape melted, and some oxidation sign, photo 6.
On the external surface of the shield there is some oxidation sign, photo 7.

Photo 6

Photo 7

On the surface of the long shield there is some residual of the protection tape melted coming from the internal shield, photo 8.

Photo 8



E) DEFECT
Failure analysis data:

- Igbt work OK;
- Electronic work OK;
- Windings carbonised;

Failure cause hypothesis:

- Probably humidity penetration on the pcb that has permitted the driving the IGBT in continuous mode determining the melting of the primary and secondary coil former.

5) CORRECTIVE ACTIONS
Starting in wk 02/07 new FSI pencil coil Gen II with primary potted, that don't permit the humidity penetration.

6) CORRECTIVE ACTIONS IMPLEMENTATION
See point 5

7) PREVENT THE RECURRENCE
See point 5.

8) TEAM CONGRATULATION
Not applied.

Audi
Quality assurance

Test Report FIELD

Complaint number	*Entry date*	*Factory*	*Complaint location*
0002505374	08.12.2006	21	USA

Damage part 06B 905 115 N Ignition coil
Delivered part 06B 905 115 N Ignition coil
Supplier 00001542 00 PULSE POWERTRAIN GMBH&CO.KG MEINERZHAGEN
AM ROTTLAND 12 58540 MEINERZHAGEN,GERMANY

Parts manager *FSN* *Dept.* *Telephone*

Damage assessor

SAGA code

Make	*Prod. daught.*	*ISO*	*DC*	*Partner*	*Task no.*	*Serial no. application date*
A	0200	USA	444	08B13	**********	**

VIN	*Replacement part*	*Damage type BD*
WAULC68E85A123454	06B 905 115 R	

Vehicle type	*Km reading*	*Delivery date*	*Repair date*	*Control data*
8E252Z	0			

Service no. 2820 ignition coil *Type of damage*

No. of complaint items	*No. of work items*	*Part manufacture date*	*Comment*
1,00	1,00	28.09.2004	

Complaint text
VA21504221 vom 12.12.2006

Complaint code *Complaint code text*

Fault code *Fault code text*
E0G16 Component overloaded / IGBT defect

Originator *Comment* *From VIN*
Not determinable

QTS status	*Delivery status*	*Completion indicator*	*In usage date*
2 17.09.2007	17.09.2007		

Test report no.	*Costs to be borne by*	*No. of cost items*
	AUDI 21 6506	1,00

Cause/Action
Vehicle damage, 4 pieces thermally overloaded, subsequent damage, PIN 1 overloaded ignition coils strongly charred, analysis not possible any more. Cause eventually from coil cylinder 2, no PIN 1/terminal 15.
PW 18/01/07

FAILURE ANALYSIS REPORT

DATE:	**26/09/2007** **07/11/2007**	**N.:** **R070253R004**	**TOTAL NUMBER OF PAGES:** **7**
FROM:	Piras A. Automotive	DEPT: AUTOMOTIVE DIRECT FAX: DIRECT PHONE:	
TO:	Mr. Kocali - VW Mr. Giere - VW	ATTN: DEPT: FAX:	
INT. COPY:	Crotti V. / Santagata G. / Forte B. / Croci A.	EXT. COPY:	
SUBJECT:	FAILURE ANALYSIS REPORT		

Issued by :	Piras A.
Checked by :	Crotti V.

1) TEAM

Team is composed by: Piras A. / Crotti V. / Santagata G.

2) PROBLEM DESCRIPTION

Eldor product code	78231003
Customer product code	07K 905 715E
Eldor data code or reference	028F6 II 4 19/07
Customer reference	11-2007.09.17-f-004
RMA	84001836
Arrival data	20/09/2007
Origin of the part and people reference	Volkswagen – Mr. Kocali
Part coming from ? Field, Factory, Motor Test, etc.	Field
How much km/h/cycle?	30000 Km
Engine used	3vwsf71kx6m676488
Customer defect	Check-Engin light came on/shaking badly/veh smoking//call when 5 mins away. Riss am Kopf. IGBT Fa. ON. X-RAY:Lötperlen PIN 1 und Vias auffällig, Spule NICHT gelängt.

3) CONTAINMENT ACTIONS

None.

4) ROOT CAUSES

A) VISUAL INSPECTION

No damaged are present on the external surface of the coil (photo 1), but on the head resin has been observed a crack on IGBT area, photo 2.

The pin of the LV connector appear overheating, photo 3.

Photo 1

Photo 2

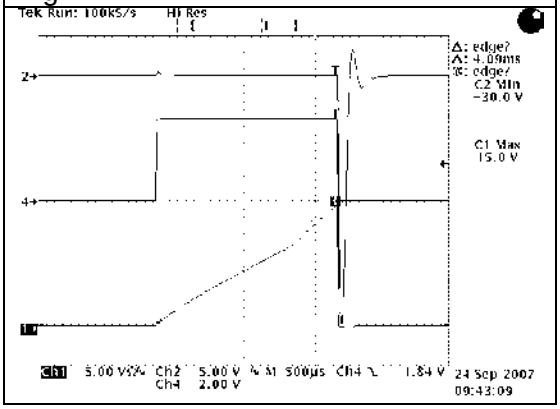
Photo 3

B) ELECTRICAL TEST

The pencil coil has been electrically verified in Eldor in the follow condition Vbatt =14V @ IP=0A; Freq.= 50Hz; IP = 15A; Load 1M//25pF.

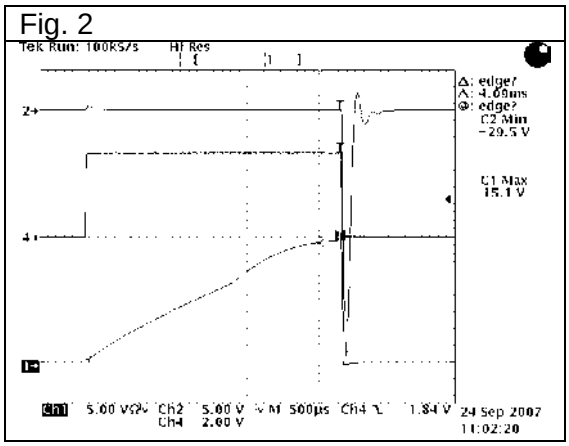
At the room temperature the coil work normally, fig. 1.

Fig. 1



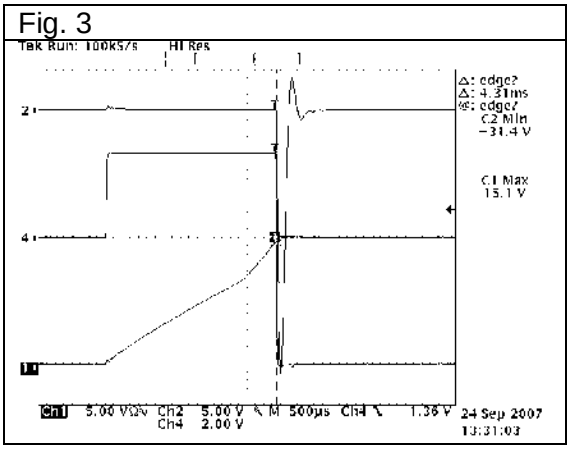
The coil has been inserted in the climatic room @ 100°C for 1h and electrically checked.
Results: The electrical behaviour is normal, fig. 2

Fig. 2



The coil has been inserted in the climatic room @ -35°C for 1h and electrically checked.
Results: The electrical behaviour is normal, fig. 3

Fig. 3



C) PRELIMINARY X-RAY
The X-ray present the damaging on the internal coil.
The photo 4, 5, 6, 7, shows the overheating of the IGBT and the consequent crack on the resin.

Photo 4

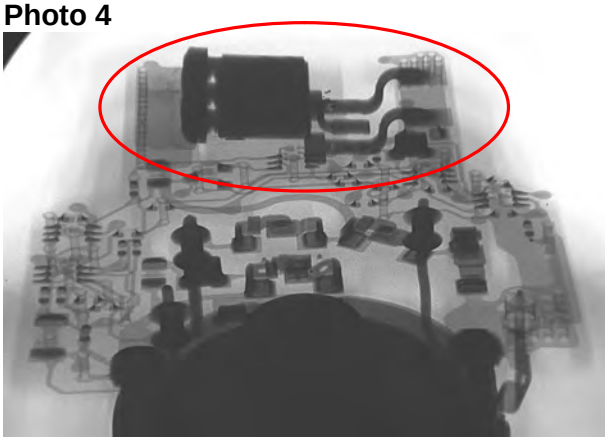


Photo 5

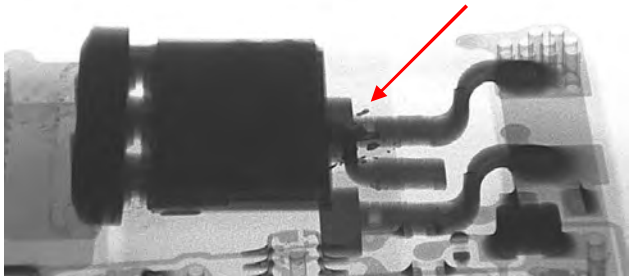


Photo 6

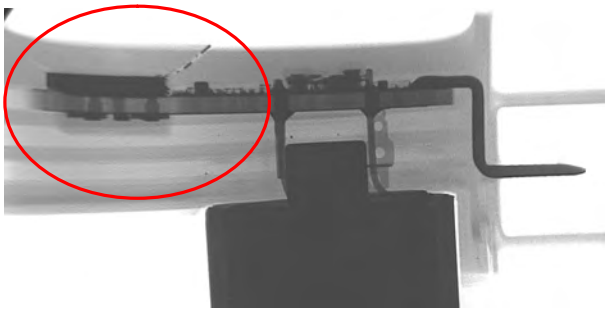
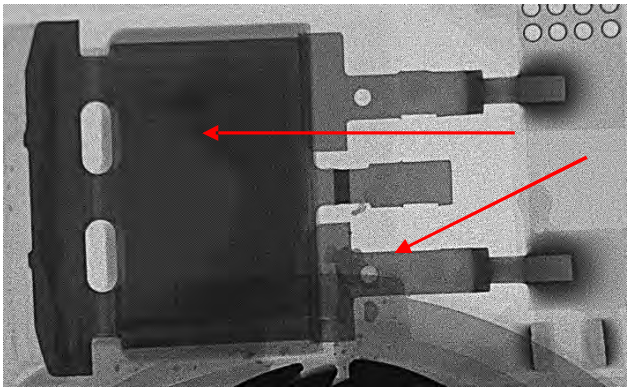
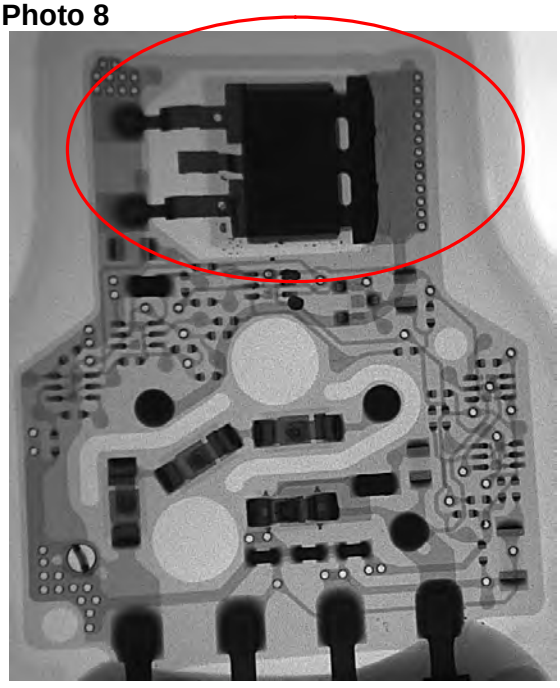


Photo 7



D) ANALYSIS OF WINDINGS AND ELECTRONIC
The pcb has been separated to windings:
The pcb appear very overheating on the IGBT area, photo 8.

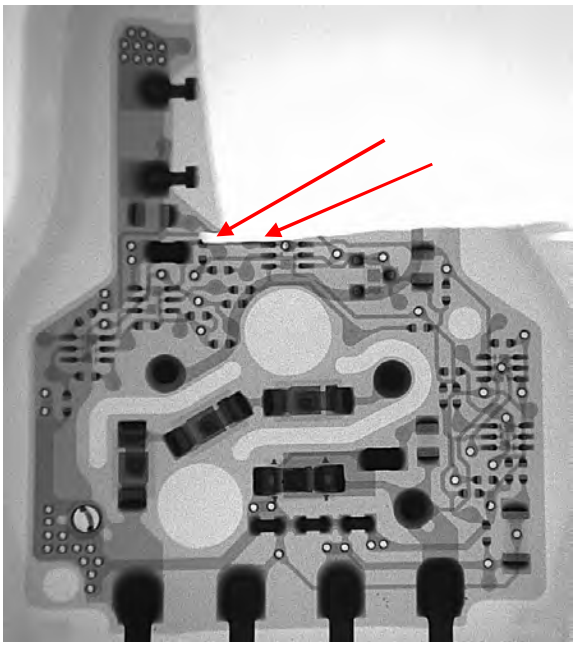
Photo 8



Successive has been extracted the IGBT from the pcb.

Unfortunately, during the cut has been damaged R23, R4, Tp 6.

Photo 9



However, the coil has a good electrical behaviour.
For further investigation about the problem, we think to sent the parts to their Supplier for analysis.

E) DEFECT
Electrical defect not confirmed.
Crack in the head resin on IGBT area.

The electronic Selcom will be sent to Supplier for further analysis on 26/09/07.
The IGBT ON will be sent to Supplier for further analysis on 26/09/07.

Information of the PCB:

Date code IGBT	IGBT Lot number	Selcom lot number
D0703	1T702414441	0122000147

PCB Supplier answer on 18/10/2007:

"Defect not found, the electronic was resulted good after the electrical test after the reparation of the cut part".

IGBT ON Supplier answer on 01/11/2007:

"The module with encapsulated IGBT device exhibited signs of thermal damage. Radiographic analysis confirmed possible damage inside the module. Curve tracer testing performed by PAL On Semiconductor indicated resistive shorts on all leads. The module was immersed in concentrated sulfuric acid in an attempt to chemically etch away the mold compound. The damage observed after chemical decapsulation is typical of massive EOS and resulting in a thermal damage. It was concluded that the most likely scenario of events was that the IGBT device was initially electrically overstressed by a high emitter current surge."

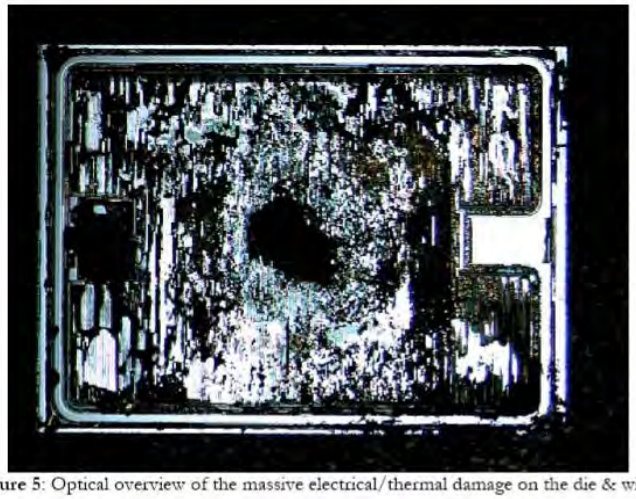


Figure 5: Optical overview of the massive electrical/thermal damage on the die & wires.

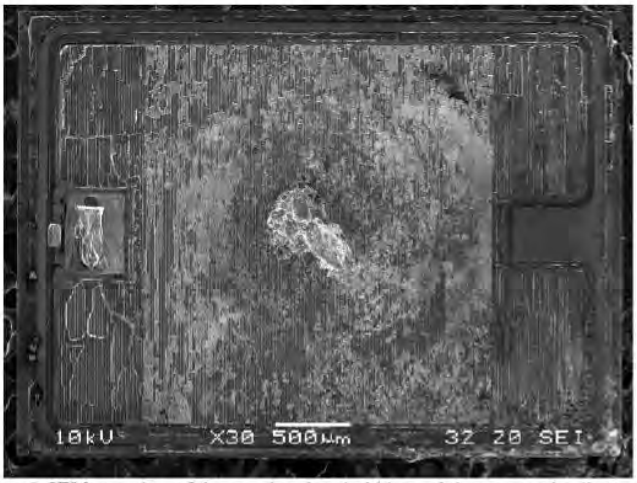


Figure 6: SEM overview of the massive electrical/thermal damage on the die & wires.

5) CORRECTIVE ACTIONS

1) Wk 26/07 : Immediate interruption of the Battery supply (+14V) in case of short circuit > Better analysis possibility at on the device.
Status : Already introduced in date **26/06/07, wk 27/07.**

2) Eldor asked to ON the possibility to double or apply more SSD pulse during the “final test” in order to check the device in more severe condition and screen out possible weakness parts.
Status: more SSD possible > Implementation of 3 SSD on both line in Wk 27/07.
Status : Already introduced in date **11/07/07, wk 27/07.**

3) High current test will be inserted from **wk 46/07**:
On the end line will be give a single pulse @ 25A, 24 Volt, on the finish coil, in order to reach 150°C for detected the weakness of the IGBT.

6) CORRECTIVE ACTIONS IMPLEMENTATION

See point 5.

7) PREVENT THE RECURRENCE

See point 5.

8) TEAM CONGRATULATION

Not applied.

FAILURE ANALYSIS REPORT

DATE: 15/11/2007	**N.:** R070292R001	**TOTAL NUMBER OF PAGES:** 5
FROM: Piras A. Automotive		DEPT: AUTOMOTIVE DIRECT FAX: DIRECT PHONE:
TO: Mr. Kocali – VW		ATTN: DEPT: FAX:
INT. COPY: Santagata G. / Crotti V. / Forte B. / Croci A.		EXT. COPY:
SUBJECT: FAILURE ANALYSIS REPORT		

Issued by :	Piras A.
Checked by :	Crotti V.

1) TEAM

Team is composed by: Santagata G. / Piras A. / Crotti V.

2) PROBLEM DESCRIPTION

Eldor product code	78231003
Customer product code	07K 905 715 E
Eldor data code or reference	027F4 I 6 16/07
Customer reference	11-2007.10.22-f-016
RMA	84001888
Arrival data	05/11/2007
Origin of the part and people reference	**Volkswagen – Mr. Kocali**
Part coming from ? Field, Factory, Motor Test, etc.	Field
How much km/h/cycle?	1000 Km
Engine used	3vwff31y97m418317
Customer defect	Costumer was driving the car and after appox 24 miles the car started to shake.He turned the car off and the car will not start now. FC04, Spule nicht gelängt, auf der Platine Lotaufschmälzungen

3) CONTAINMENT ACTIONS

None.

4) ROOT CAUSES

A) VISUAL INSPECTION

The coil appears very damaged on the head, photo 1. 2.

Photo 1

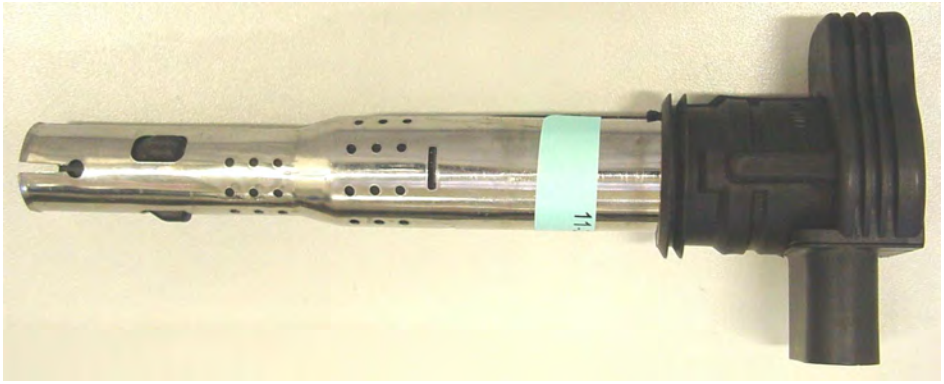


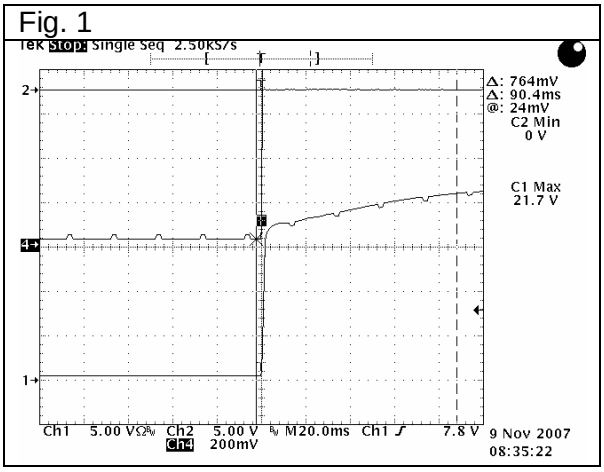
Photo 2

B) ELECTRICAL TEST

The pencil coil has been electrically verified in Eldor in the follow condition Vbatt =14V @ IP=0A; Freq.= 50Hz; IP = 15A; Load 1M//25pF.

The coil not work ok, fig. 1

Fig. 1



C) X-RAY INSPECTION

The X-ray show the pcb area very damaged and melted, photo 3, 4.

Photo 3

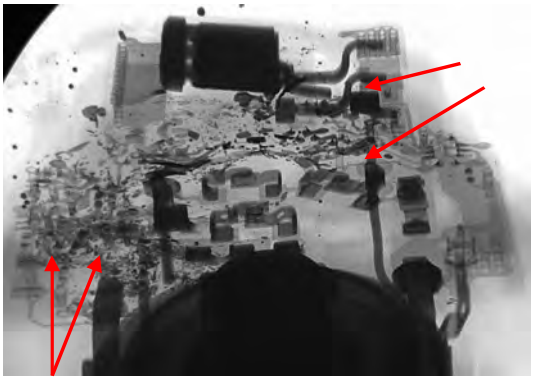
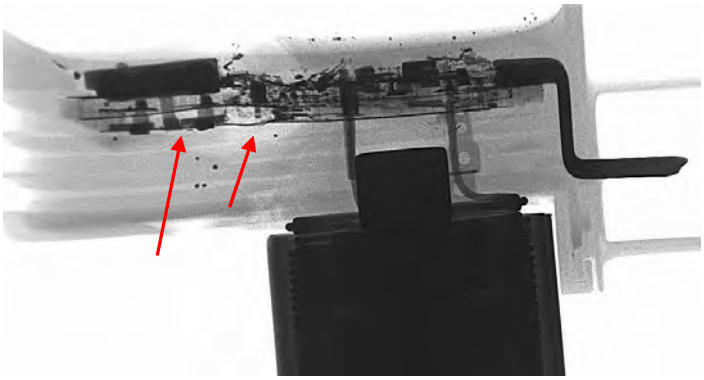


Photo 4



D) ANALYSIS OF WINDINGS AND ELECTRONIC
The X-ray, show the pcb very damaged on its internal, photo 5.
The electronic has been polished until to bottom side.
Photo 6, show the burnt area on the bottom side of the electronic.

Photo 5

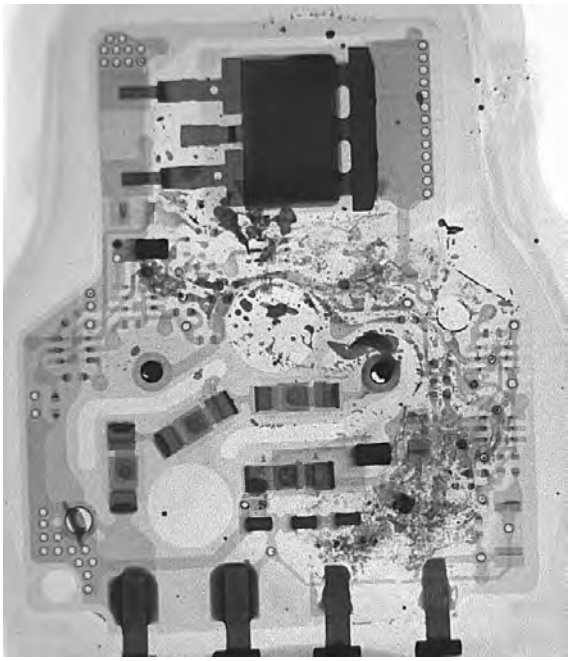


Photo 6

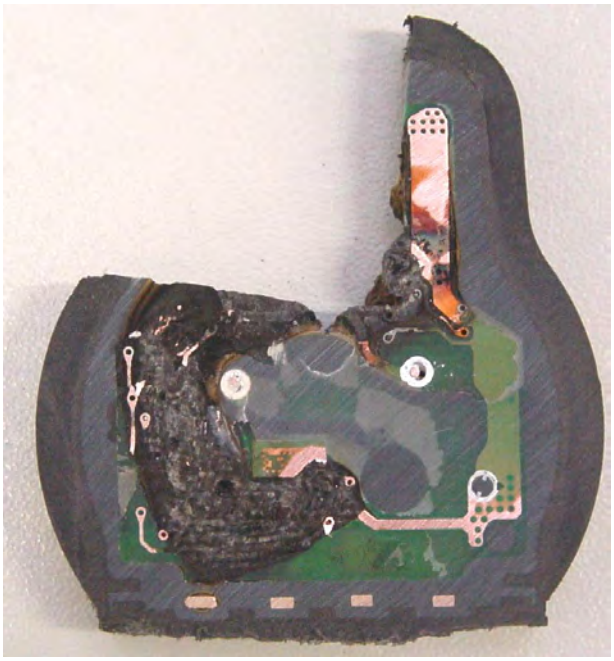


Photo 7, 8, show the condition of the IGBT extracted from the pcb.

Photo 7

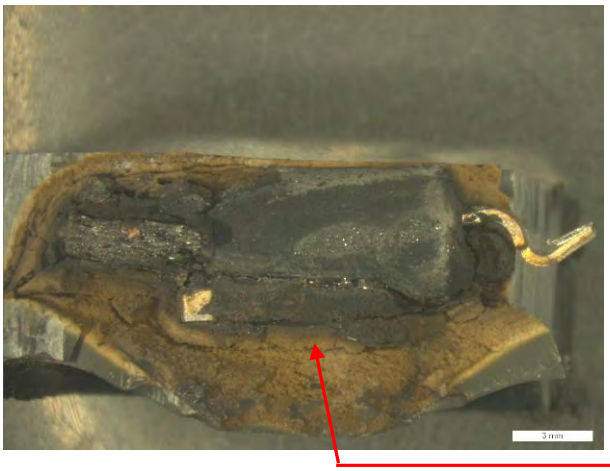
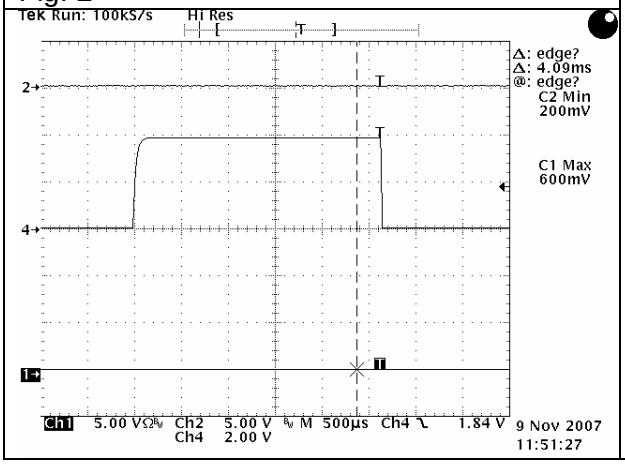


Photo 8

The IGBT has been checked with a sure good electronic and windings: NOT OK, fig. 2.

Fig. 2



<u>Measurement of the resistance of the IGBT:</u>

Rge = 9,88 MOhm;
Rgc = 16,0 MOhm;
Rce = 60,58 Ohm;

Igbt defectives

The windings appear very melted for the high temperature to reach during the functioning, see photo 9.

Photo 9

On the internal surface of the shield there are present a lot residuals of the plastic melted, see photo 10.
On the external surface of the shield are not observed damaged or anomalies, photo 11.

Photo 10

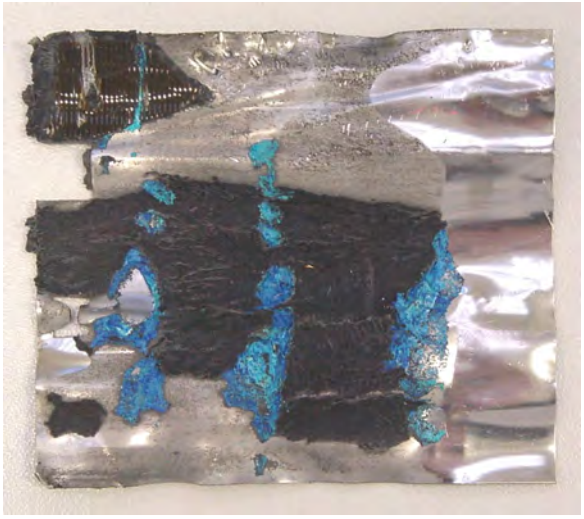


Photo 11

On the internal surface of the shield are not observed damaged or anomalies, photo 12.

Photo 12

E) DEFECT

Failure analysis data:

- Igbt carbonised;
- Windings melted;
- Electronic burnt;

The level of the damaging is too high for perform the analysis.

5) CORRECTIVE ACTIONS

6) CORRECTIVE ACTIONS IMPLEMENTATION
See point 5

7) PREVENT THE RECURRENCE
See point 5.

8) TEAM CONGRATULATION
Not applied.

8D-Report

Berichts-Nr. : MPA07-048

Verteiler :	**Audi :** Hr. Fischer, Hr.Knolmayer, Hr. Schie, Hr. Wéber **Skoda :** Hr. Sticky **VW:** Dr. Bennewitz, Hr. Fricke, Hr. Giere, Hr. Katzenellenbogen, Hr. Nohtse, Dr. Roeper **Pulse :** Hr. Auerswald, Dr. Bayard, Hr. Fischer, Hr. Gau, Hr. Laube, Hr. Meinke, Hr.Otto, Hr. Teegler	**Datum :** 31.01.2008
Erzeugnis : Stabzündspule **Herstellungsdatum :** L2 8478 7 19/06	**Erz.-Nr. :** 12456esm **Kunden-Nr. :** 022 905 100 S	**Eing.datum :** 27.12.2007
Kundendaten :	**Beanstandungstitel :** Feld-Rückläufer **SAB- / PB- / QTS-Nr. :** VP0705959 / QTS-Nr.2814779 **Motor- / Fahrgest. Nr. :** BHK / WA1BY74L67D026274	**lfd. Pulse-Nr. :** 8080 **Fehlercode :** 98 E

1. Team : Hr. Auerswald, Hr.Teegler, Hr. Fischer, Hr. Gau

Abt. : Pulse PowerTrain-QS

Teamleiter : Hr. Fischer

Telefon : 02354 / 777-195

Mail : ffischer@pulseeng.com

Beanstandung ist relevant für :		**Reklamation**	
Prozess-FMEA :	☐	**anerkannt**	☐
Konstruktions-FMEA :	☐	**abgewiesen**	X
Es liegt kein Pulse-Fehler vor :	X	**offen**	☐

2. Beanstandungsgrund : Engine light on, misfire cylinder4

Beanstandungsmenge : 1 **Wiederholfehler :** **ja :** X **nein :** ☐

Geprüfte Stückzahl : 1

Fehlerhafte Stückzahl : 1

3. Fehlerursache :

Die Stabspule hat einen Durchschlag am HS-Rüssel des Primärspulenkörpers.
Ursache hierfür ist eine thermische Überlastung (motorseitig), die zum Aufschmelzen des HS-Rüssels und somit letztentlich zum Isolationsverlust geführt hat.
Eine defekte oder falsch montierte Zündkerze könnte der Auslöser hierfür gewesen sein, auch ein Funkenüberschlag zwischen der Stabspule und dem SAE-Anschluss der Zündkerze ist als Auslöser denkbar (siehe MPA07-047).

4. Sofortmaßnahmen : keine

Einführungstermin : **Wirksam ab FD :**

5. Langfristige Maß-nahmen: keine

Einführungstermin : **Wirksam ab FD :**

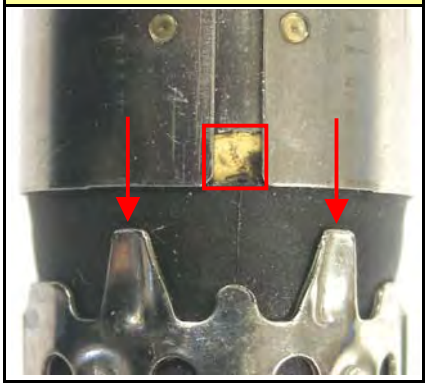
6. Nachweis der Wirksamkeit der Maßnahmen :

7. Maßnahmen zur Vermeidung von Wiederholfehlern :

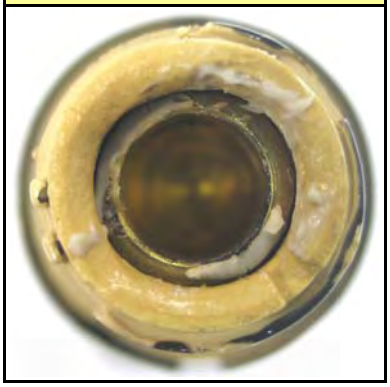
Erstellt durch :	U.Teegler	**Tel. :**	02354 / 777-149	**Datum :**	31.01.2008
		Mail. :	uteegler@pulseeng.com		

Stabspule komplett

Schirmbleche abgerutscht

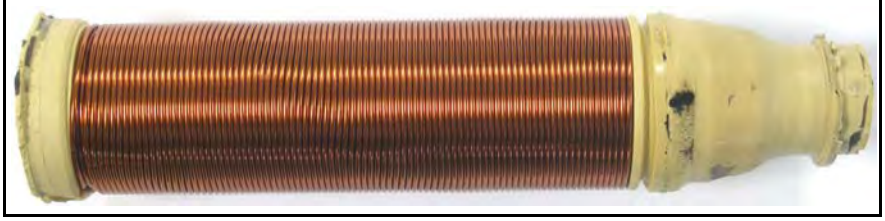


HS-Rüssel geschmolzen



Spulensystem komplett - HS-Rüssel thermisch deformiert

Spulensystem ohne Schutzfolie



Primärspulenkörper - Durchschlag am aufgeschmolzenen HS-Rüssel

Beschreibung:

- schon im Anlieferungszustand ist eine Längung der Stabspule im Bereich der Schirmbleche und eine Überhitzung des HS-Rüssels erkennbar

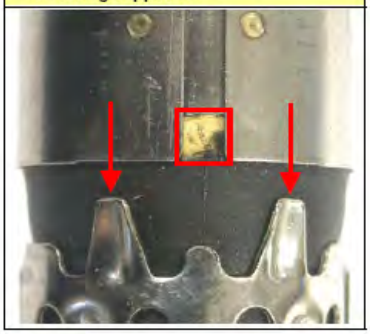
- nach der Demontage der Schirmbleche und des HS-Schutzschlauches sieht man deutlich, dass der HS-Rüssel deformiert und im Bereich des HS-Anschlusses geschmolzen ist

- durch die (motorseitige) Überhitzung (Kerze defekt, Überschläge zw. Spule und Kerze o,ä.) und die daraus resultierende Aufschmelzung des HS-Rüssels erfolgte ein Durchschlag zum Rückschlussblech

Reason for complaint:
Engine light on, misfire cylinder 4
Cause of the fault:
The trunk of the primary ignition coil is penetrated. The cause could be an overheating (on engine side) which caused the melting of the trunk and the loss of insulation. This could have been started by a faulty or wrongly fitted spark plug, a spark-over between the coil and the SAE connection of the spark plug is also possible (see MPA07-047).

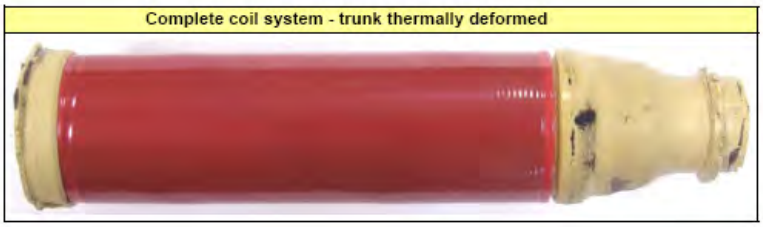
Complete coil

Shielding slipped off

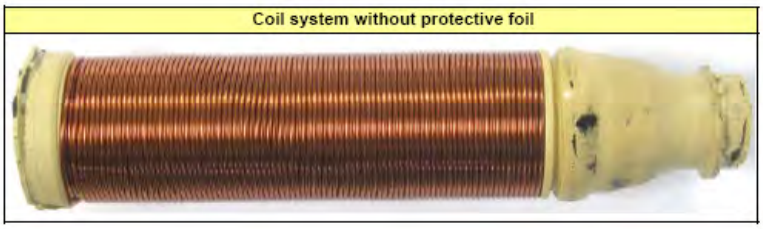


melted

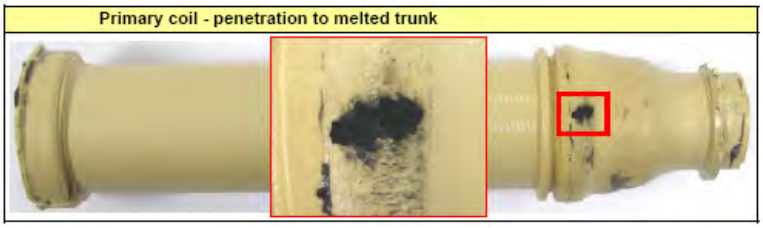
Complete coil system - trunk thermally deformed



Coil system without protective foil



Primary coil - penetration to melted trunk



Description:

- A lengthening of the ignition coil in the area of the shielding and an overheating of the trunk could be recognised straight away.
- After removing the shielding and the protective hose it becomes clear that the trunk is deformed and melted in the area of the connection.
- The overheating (at engine end, spark plug missing, spark-over between coil and spark or similar) and the resulting melting led to a pressure knock on the end plate.

VOLKSWAGEN
AKTIENGESELLSCHAFT

Konzernlabor

Metalle

11-Z-07-8171 SZS Fa. Eldor

12.02.2008

Zusammenfassung

Zur Analyse wurden fünf Spulen 07K 905 715E der Fa. Eldor mit dem FD: 2007/10 zusammen mit dem dazugehörigen MoVo-Kabelsatz übergeben. Die Teilen stammen aus einem VW Jetta, 2,5 ltr. 110kW.

11-2007.12.07-f-001

Schadensursächlich war vermutlich ein fehlerhafter IGBT

- Die Widerstandsmessung am IGBT weist auf Durchlegierung des Bauteil hin.
- An den Abschirmblechen befanden sich Feuchtigkeitsspuren.

Übersicht

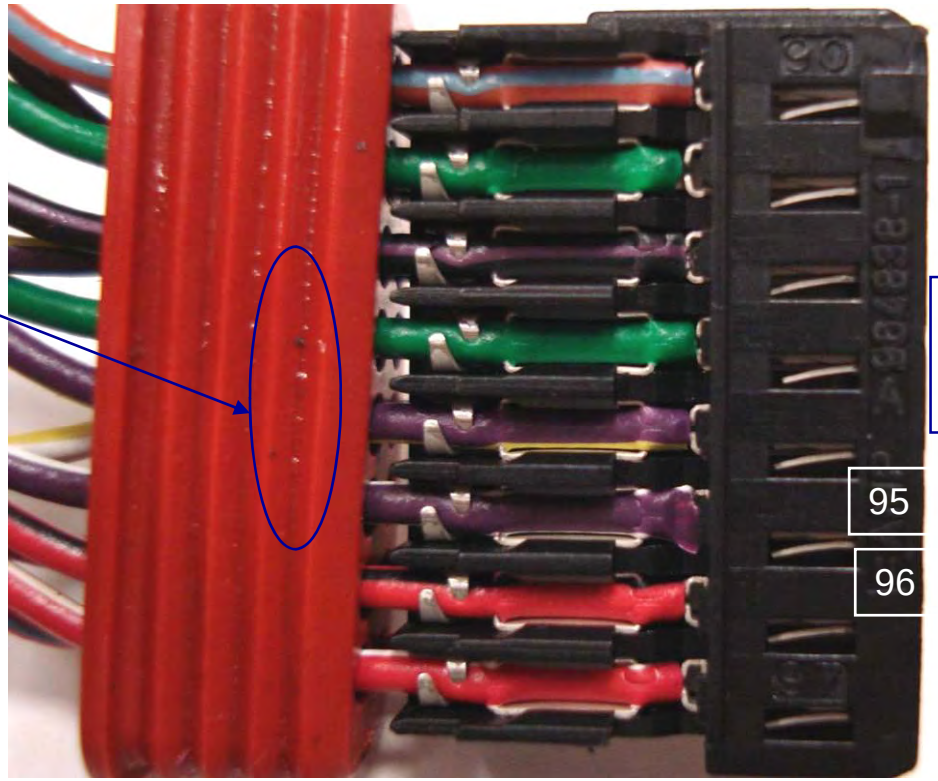
MoVo aus dem FZG.

Spule 11-2007.12.07-f-001

MoVo Widerstands-Messung, Begutachtung

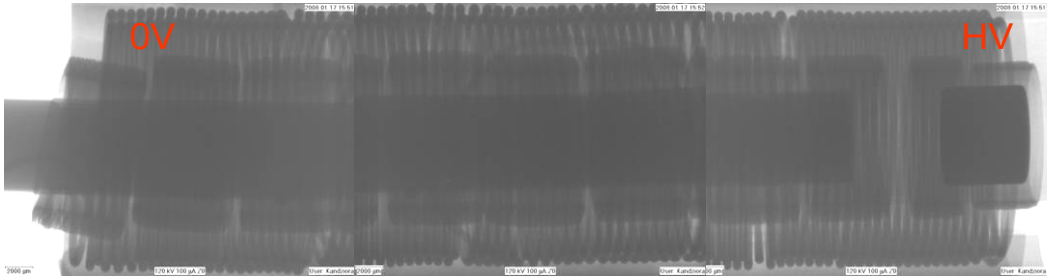
Widerstandsmessung zwischen den Steuerpins der Spulen und den Pins der Einspritzventile ergab keine auffälligen Widerstandswerte ($R_{95-96}=\infty\Omega$).

Ölhaltige Flüssigkeit an der Radial-dichtung des Stecker



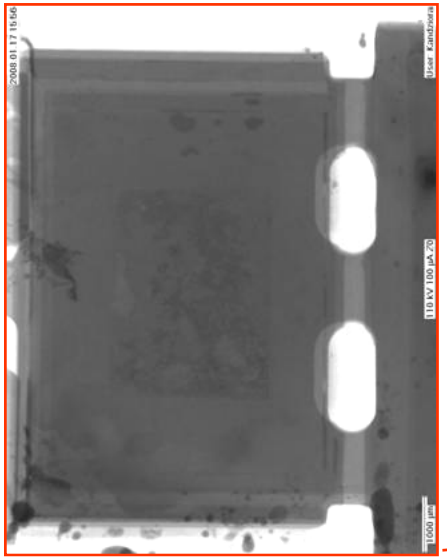
Keine Wasserspuren an den Kontakten im Steuergerät- Stecker

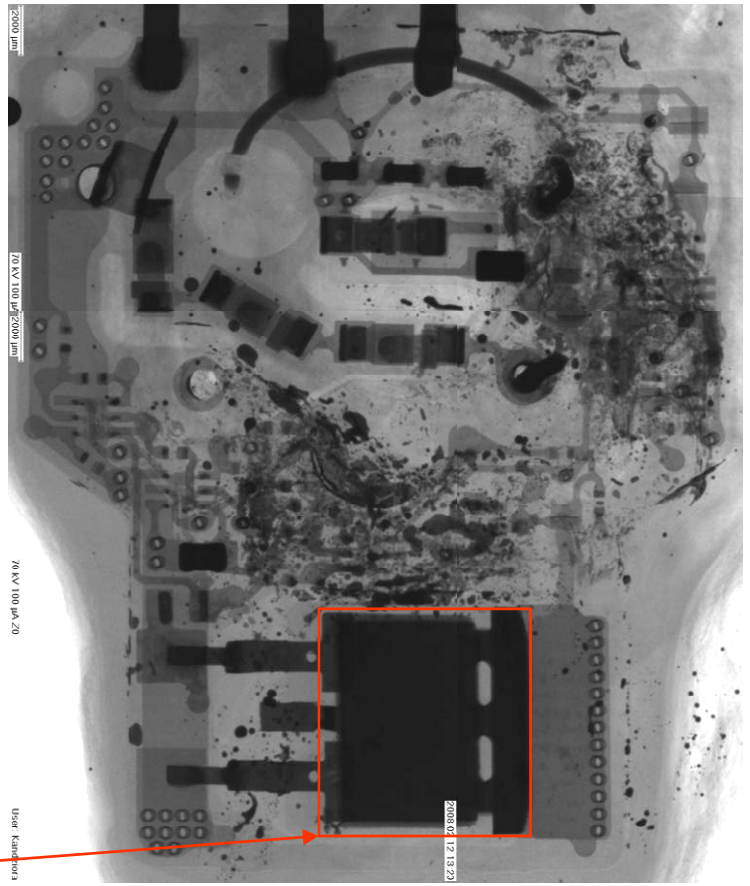
Spulen X-ray



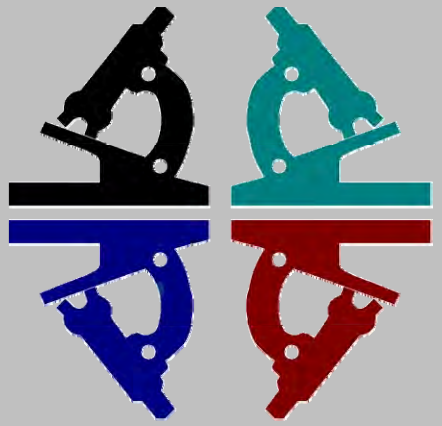
Spulenkörper gelängt

IGBT mit leichten Spuren einer thermischen Überlastung





VOLKSWAGEN
AKTIENGESELLSCHAFT



Company laboratory

Metals

11-Z-07-8171 SZS Eldor

12.02.2008

Summary

Five 07K 905 715E Eldor coils with the
FD: 2007/10 together with the respective engine pre-wiring wiring loom were handed over for analysis. The parts come from a VW Jetta, 2.5 l 110kW.

11-2007.12.07-f-001

A faulty IGBT was probably the cause of the damage

- The resistance measurement of the IGBT suggests alloying of the part.
- There were traces of dampness on the deflectors.

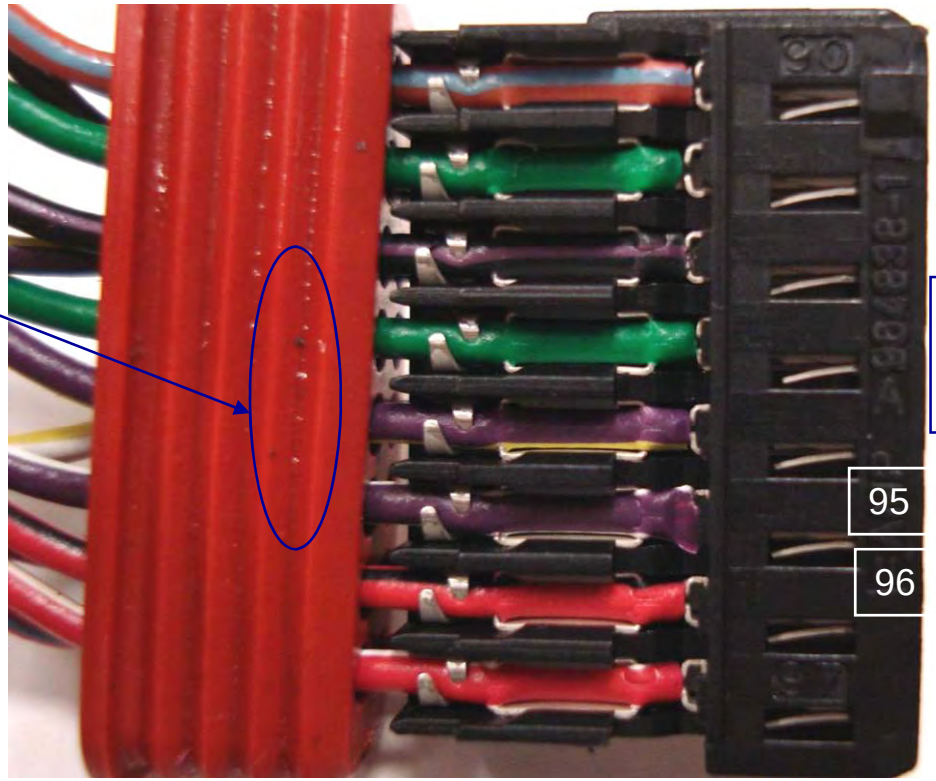
Overview

Engine pre-wiring from the vehicle.

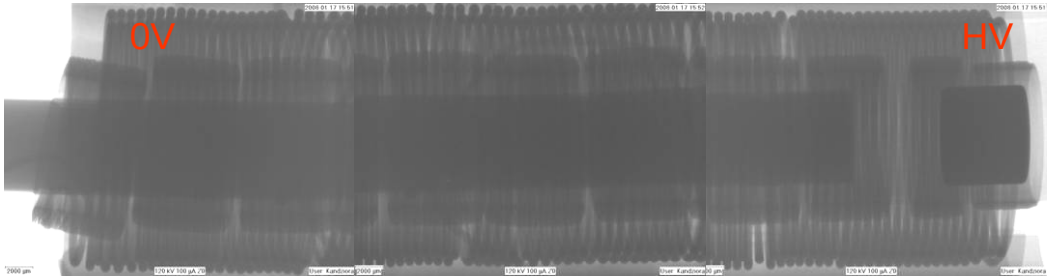
Coil 11-2007.12.07-f-001

Engine pre-wiring resistance measurement, inspection

Resistance measurement between the control pin of the coils and the pins of the injection valves did not produce any noticeable resistance values ($R_{95-96}=\infty\Omega$).

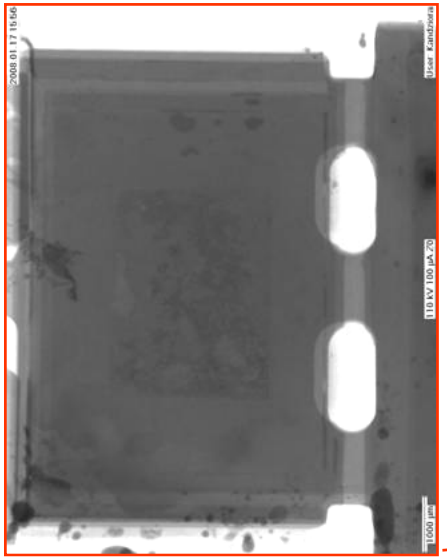


Coil x-ray

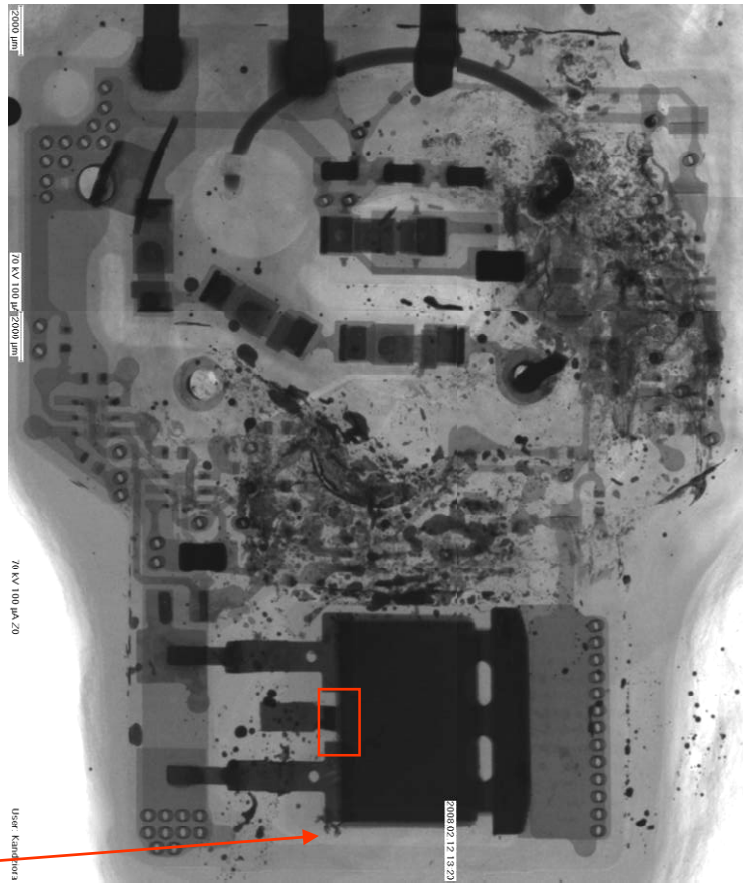


Coil body stretched

IGBT with light traces of overheating



Pin 4 Pin 1



Teilenummer	Bennennung	Zeichnungsdatum	Lieferant	Note
.07K.905.715.D	Stabzündspule			-

RK mit GenII Stabzündspule aus dem Markt USA

1 Aufgabenstellung

Im Markt USA ist ein Jetta A5 (VIN: 3VWGF71K57M158585) abgebrannt, bei dem ein Gutachter zu der Schlussfolgerung gelangt, dass die Stabzündspule (Gen II) der Firma Eldor Fehler verursachend war. Aus dem vorliegendem Bildmaterial geht jedoch hervor, dass dies nicht Fall ist. Im Rahmen dieses LIMS-Auftrages sollen die Stabzündspulen daher eingehend analysiert werden.

2 Zusammenfassung

Keine von den fünf Spulen war schadenursächlich.

Alle Spulen weisen eine äußere thermische Zerstörung auf. Die Spulen 1-4 sind elektrisch i.O.

Die Spule aus dem Zylinder 5 zeigt keine elektrische Funktion, was vermutlich durch Lotaufschmelzung auf der Platine hervorrufen wurde. In der Radioskopie läßt sich kein Schadensausgangspunkt auf der Platine erkennen, so daß die Schädigung auf eine äußere Wärmeeinwirkung zurückzuführen ist.

3 Einzelergebnisse

Spulen mit der SAB Nummer 10-2008.06.30-f-002 bis -006

- **Optische Begutachtung**

Zyl.1 Zyl.2 Zyl.3 Zyl.4 Zyl.5
Abbildung 1: Spulen Übersicht

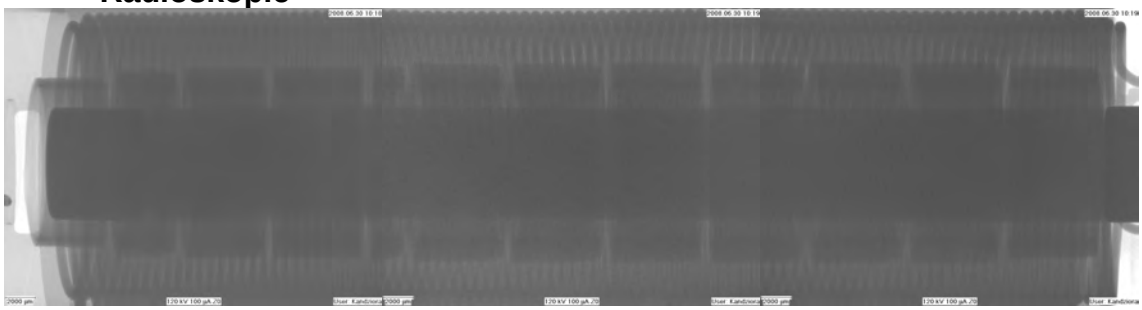
Abbildung 2: Spulen Übersicht

An allen Spulen befinden sich Feuchtigkeitsspuren im Bereich des Zündkerzen-Anschlusses.
Die Spulenköpfe weisen eine thermische Verformung auf, wahrscheinlixch aufgrund einer externen Wärmequelle.

- **Elektrische Vermessung**

Auf Grund der Zerstörung ist es nicht möglich bei der Spule aus dem Zyl.5 eine elektrische Prüfung durchzuführen.
Alle anderen Spulen aus dem Satz sind elektrisch unauffällig.

- **Radioskopie**



HV **0V**

Abbildung 3: Zyl. 5, das Spulensystem ist nicht gelängt.

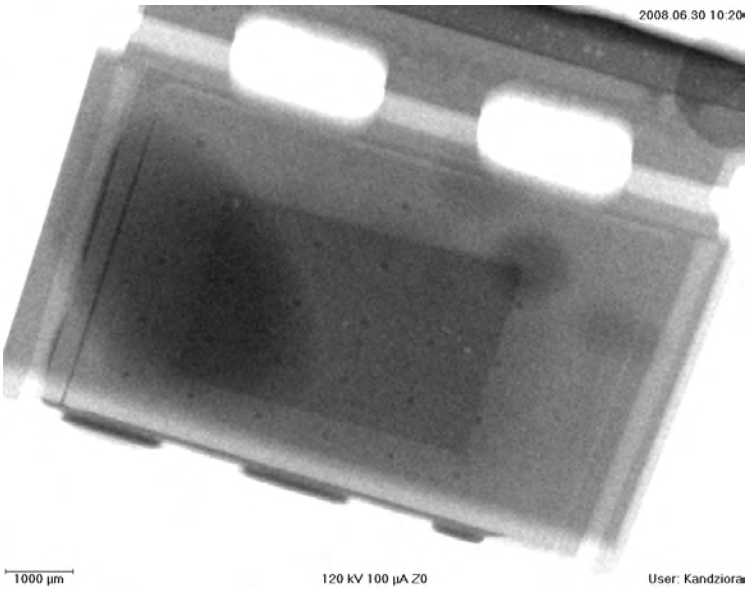


Abbildung 4: Zyl.5 IGBT

Der IGBT weist keine Schädigung auf.

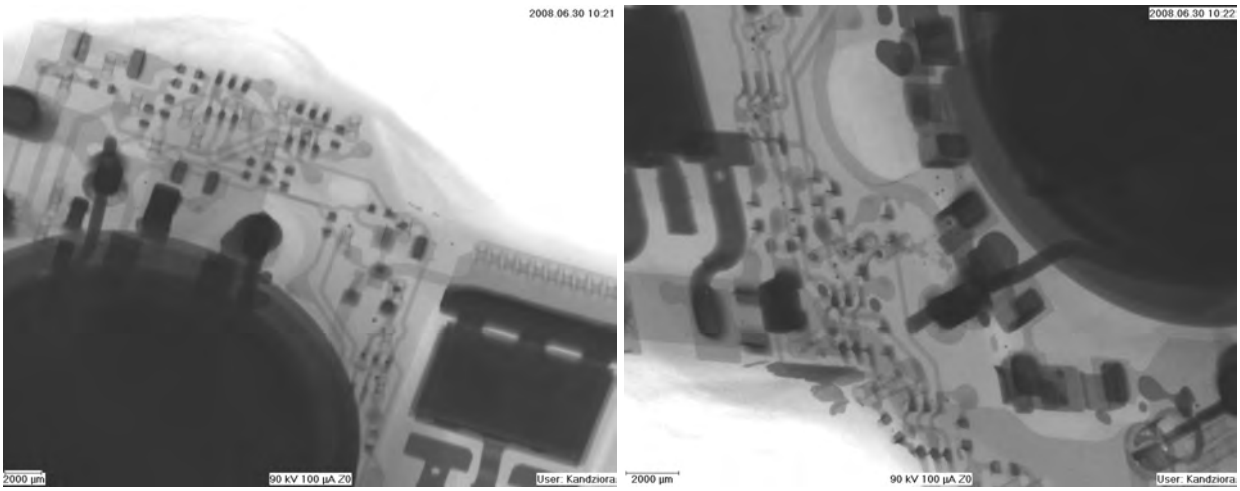


Abbildung 5: Zyl.5, Platinen Ansicht

An der Platine befinden sich kleine Lotaufschmelzungen, die vermutlich durch äußere Hitzeeinwirkung hervorrufen sind. Ein Ausgang des Schadens von der Platine ist nicht zu erkennen.

4 Durchführung

Die Ergebnisse dieser Untersuchungen wurden unter der Mitwirkung von IAV - Mitarbeitern erzeugt. Die Röntgendurchstrahlungsuntersuchung wurde an der Phönix Nanomex 160NF durchgeführt. Die Einzelergebnisse und Maschinenparameter können bei GQL-LM/5 eingesehen werden. Die Spulen stehen bei GQL-LM/5 für weitere Analysen zur Verfügung.

1 Task

In the USA market, a Jetta A5 (VIN: 3VWGF71K57M158585) burnt down in which an independent inspector came to the conclusion that the ignition coil (Gen II) from Eldor was the cause of the fault. However, it emerges from the images at hand that this was not the case. The ignition coils should therefore be exhaustively analysed as part of this LIMS order.

2 Summary

None of the five coils were the cause of the damage.

All coils suggest an external thermal destruction. The coils 1-4 are electrically OK.

The coil from cylinder 5 shows no electrical function which was probably caused by solder melting on the printed circuit. The radioscopy does not recognise a damage point of origin on the printed circuit so that the damage could be traced back to an external thermal effect.

3 Individual results

Coils with SAB number 10-2008.06.30-f-002 to -006

- **Visual inspection**

Cyl.1 Cyl.2 Cyl.3 Cyl.4 Cyl.5
Image 1: coil overview

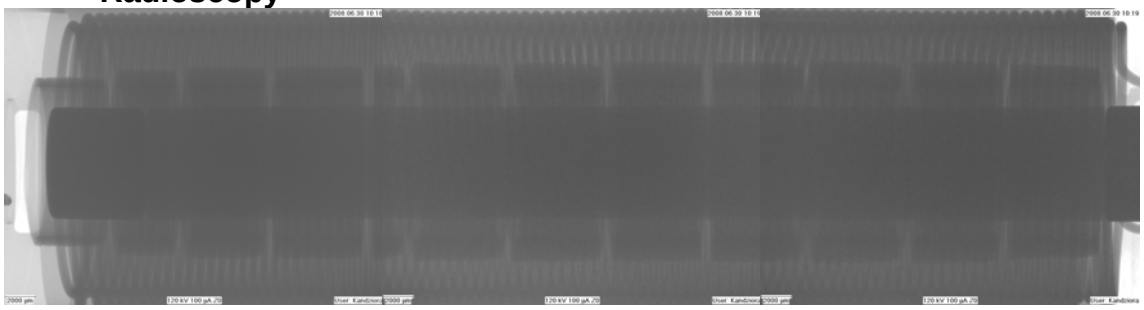
Image 2: coil overview

There are traces of dampness in the area of the spark plug connection on all the coils.
The coil heads exhibit a thermal deformation, probably because of an external heat source.

- **Electrical alignment**

Because of the destruction it is not possible to carry out an electrical check on the coil from cyl. 5.
All other coils from the batch are electrically unobtrusive.

- **Radioscopy**



HV **0V**

Image 3: Cyl. 5, the coil system is not stretched.

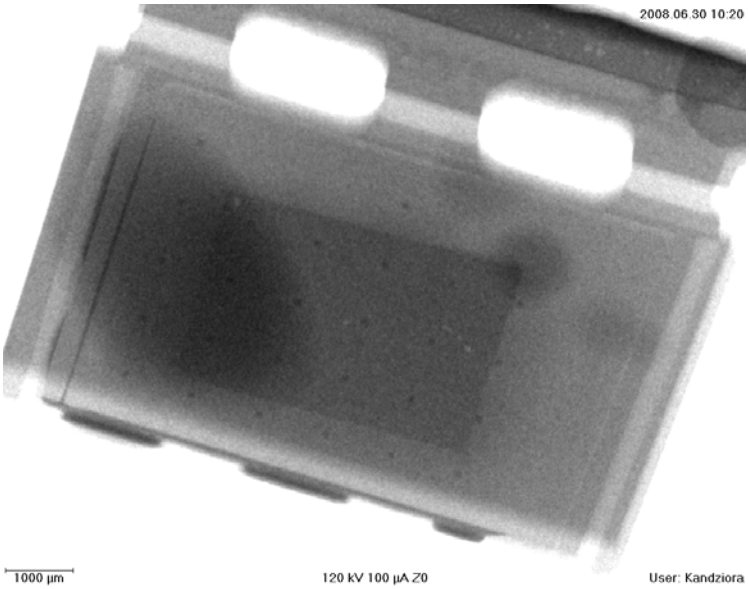


Image 4: Cyl.5 IGBT

The IGBT cannot find any damage.

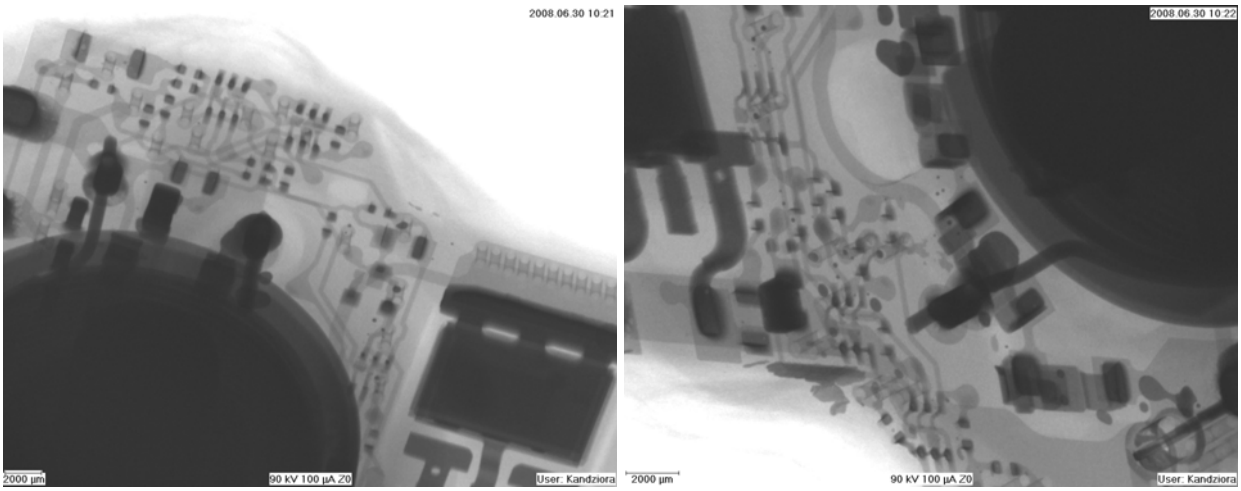


Image 5: Cyl.5, printed circuit view

There are small solder fusings on the printed circuit that were presumably caused by external heat effects. An outcome of the damage to the printed circuit cannot be determined.

4 Processing

The results of these investigations were carried out with the help of IAV employees. The x-ray investigation was carried out on the Phoenix Nanomex 160NF. The individual results and machine parameters can be viewed in GQL-LM/5. The coils are available for further analyses at GQL-LM/5.

Audi
Quality assurance

Test Report FIELD

Complaint number	*Entry date*	*Factory*	*Complaint location*
0003152409	30.09.2008	21	USA

Damage part 07K 905 715 D Ignition coil

Delivered part 07K 905 715 D Ignition coil

Supplier 00075042 00 ELDOR CORPORATION S.P.A. ORSENIGO
VIA CAIO PLINIO 18 22030 ORSENIGO, ITALY

	FSN	*Dept.*	*Telephone*
Parts manager			
Damage assessor			

SAGA code

Make	*Prod. daught.*	*ISO*	*DC*	*Partner*	*Task no.*	*Serial no. application date*
A	0200	USA	444	01C08	97659	01

VIN	*Replacement part*	*Damage type BD*
WAUDF78E98A060077	07K 905 715 D	0040 0

Vehicle type	*Km reading*	*Delivery date*	*Repair date*	*Control data*
8EC5EL	2.905	30.04.2008	17.09.2008	110

Service no. 2820 ignition coil ***Type of damage*** 0040

No. of complaint items	*No. of work items*	*Part manufacture date*	*Comment*
1,00	1,00	19.02.2008	06.11.2008

Complaint text
INFO to supplier in week 45/08 (reminder)

Complaint code	*Complaint code text*
SA040	Electrical fault
Fault code	***Fault code text***
E0G47	Component overloaded / circuit board

Originator	*Comment*	*From VIN*
Supplier		

QTS status	*Delivery status*	*Completion indicator*	*In usage date*
2 25.11.2008	25.11.2008		

Test report no.	*Costs to be borne by*	*No. of cost items*
08660866	Supplier 00075042 00	1,00

Cause/Action
Coil strongly damaged, definite fault source cannot be identified.

Stabzündspule aus dem Markt USA: WVWJK73C99P012603

Entwurf		Zwischenbericht Nr.	x Abschlussbericht	Anzahl Zwischenberichte:	
Teilenummer	Benennung	Zeichnungsdatum	Lieferant		Note
.06F.905.115.F	Stabzündspule		Pulse		-

1 Aufgabenstellung

Im Rahmen der Behördenberichtserstattung wurde das oben genannte Fahrzeug als Totalschaden gemeldet. Als Schadensverursacher für den Fahrzeugbrand wurde die Stanzündspule genannt. Bitte Stabzündspule und Kabelbaum in bekannter Weise analysieren:

VIN: WVWJK73C99P012603

Fahrzeug: Passat B6, 2.0l mit 147 kW

Produktionsdatum Fahrzeug: 26.06.2008

Erstzulassung: 25.09.2008

Ausfalldatum: 19.10.2009

Kilometerstand: ca. 10.000 km

Fehleransprache: CUSTOMER STATED THAT ON OCTOBER 01, 2009 AT APPROXIMATELY 7:00 P.M. SHE WAS OPERATING THE SUBJECT VEHICLE ON THE FREEWAY WHEN SHE NOTICED THE VEHICLE WAS SMOKING AND THAT THE MIL WAS ACTIVATED AND FLASHING.

2 Zusammenfassung

Alle vier Spulen weisen einen sehr hohen Schädigungsgrad auf, so dass eine gesicherte Aussage über den Schadensverlauf nicht mehr möglich ist.

In der Röntgendurchstrahlung zeigt sich auf der Platine von Spule „-4“ ein zerstörtes RC-Glied. Dies könnte ein Hinweis darauf sein, dass ein Bauteil-Defekt am RC-Glied zu einem erhöhten Stromfluss durch Spule „-4“ geführt hat und somit Auslöser für das RK-Ereignis gewesen sein könnte.

Auch eine äußere Wärmeeinwirkung auf die Zündspulen ist als Schadensursache nicht auszuschließen.

Bildablage:

3 Einzelergebnisse

- **Optische Begutachtung**

Abbildung 1: Spulen Draufsicht

-1 **-2** **-3** **-4**

Abbildung 2: Spulenkopf Draufsicht

- **Elektrische Vermessung**

Bei den Spulen ist es aufgrund der Zerstörung nicht möglich elektrische Prüfungen durchzuführen.

- **Radioskopie**

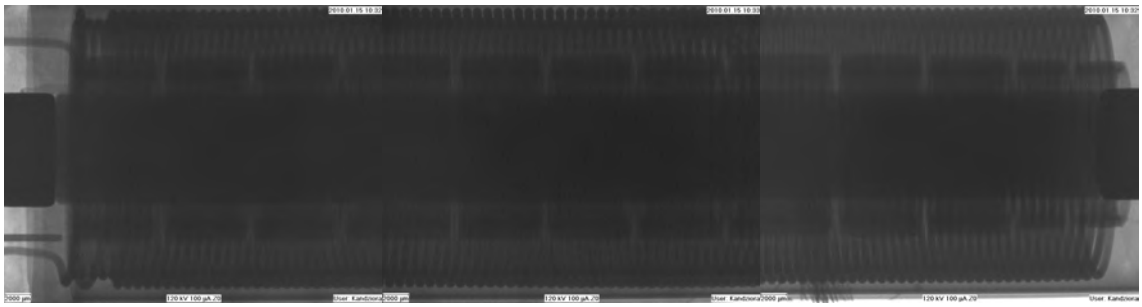


Abbildung 3: Spulensystem -1, nicht gelängt

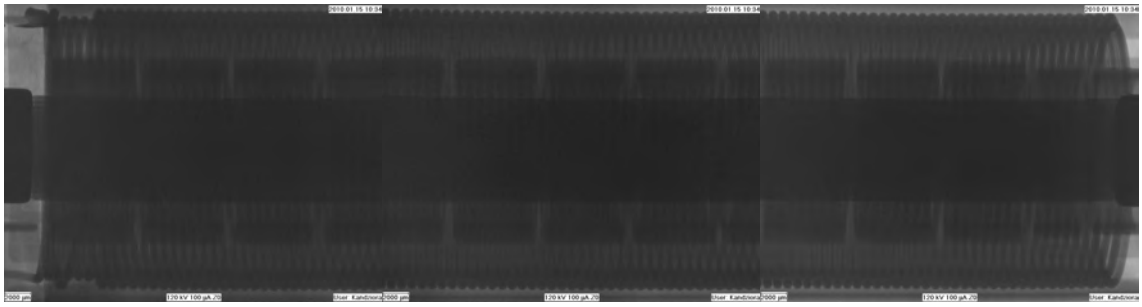


Abbildung 4: Spulensystem -2, nicht gelängt

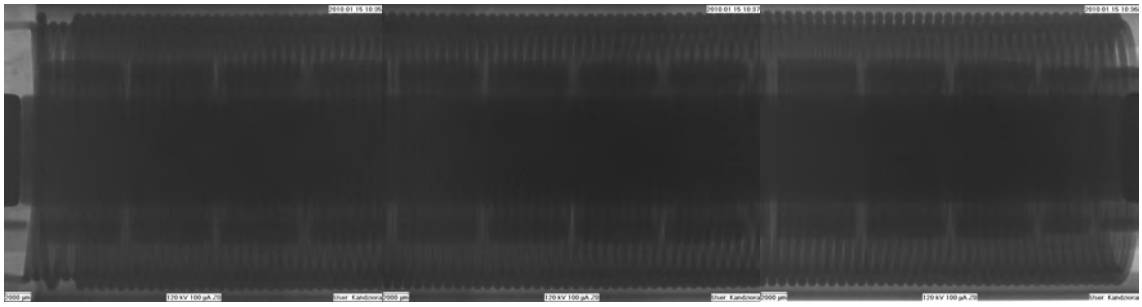


Abbildung 5: Spulensystem -3, nicht gelängt

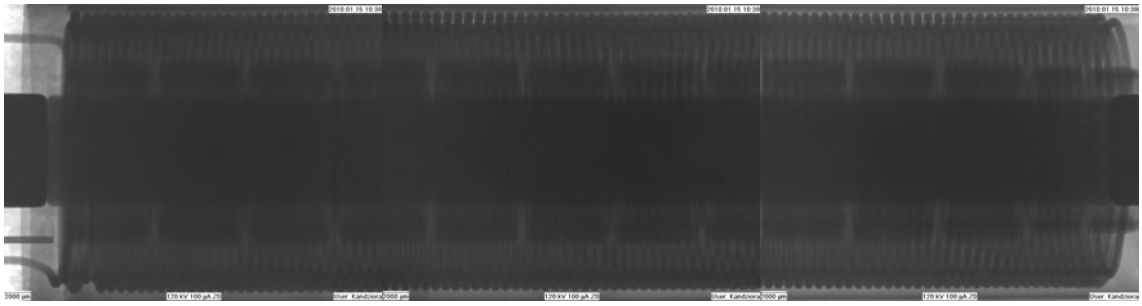


Abbildung 6: Spulensystem -4, nicht gelängt

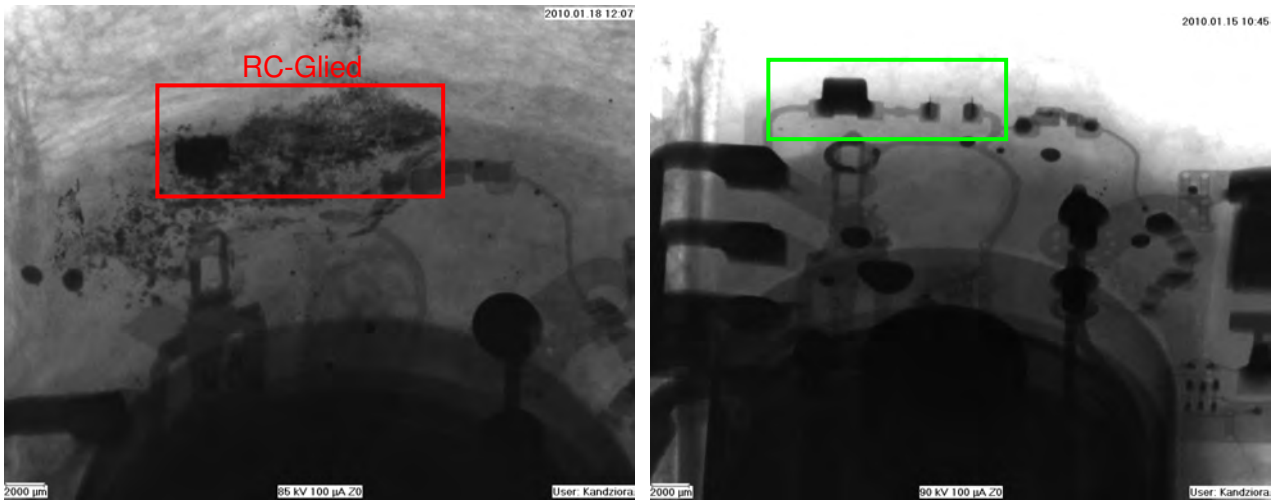


Abbildung 7: Platine“-4“, RC-Glied beschädigt „-1“-> i.O., exemplarisch auch für „-2“ u. „-3“

Abbildung 8: Platine-4, Bereich des RC -Gliedes

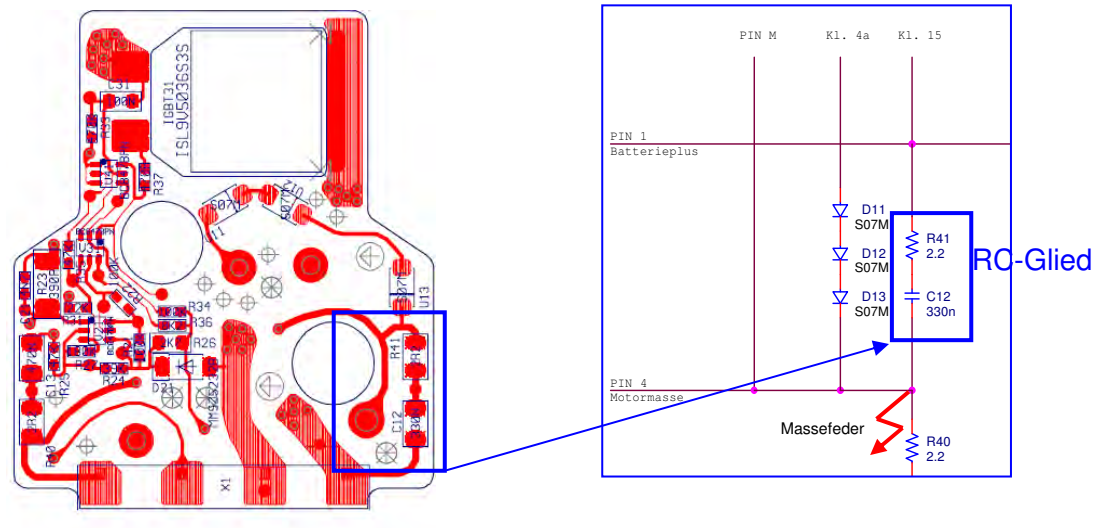


Abbildung 9: Platinen Layout und Teilausschnitt der Schaltung.

4 Durchführung

Die Ergebnisse dieser Untersuchungen wurden unter der Mitwirkung von IAV - Mitarbeitern erzeugt. Die Röntgendurchstrahlungsuntersuchung wurde an der Phönix Nanomex 160NF durchgeführt. Die Einzelergebnisse und Maschinenparameter können bei GQL-LM/5 eingesehen werden. Die Spulen stehen bei GQL-LM/5 für weitere Analysen zur Verfügung.

Ignition coil from the USA market: WVWJK73C99P012603

	Draft		Interim report no.	x	Final report	Number of interim reports:

Part number	Designation	Drawing date	Supplier	Score
.06F.905.115.F	Ignition coil		Pulse	-

1 Task

The vehicle named above was reported as write-off as part of the authority report. The ignition coil was given the cause of damage for the vehicle fire. Please analyse ignition coil and wiring loom in the usual way:

VIN: WVWJK73C99P012603

Vehicle: Passat B6, 2.0l with 147 kW

Vehicle production date: 26.06.2008

First registration: 25.09.2008

Date of failure: 19.10.2009

Kilometre reading: approx. 10,000 km

Faults: CUSTOMER STATED THAT ON OCTOBER 01, 2009 AT APPROXIMATELY 7:00 P.M. SHE WAS OPERATING THE SUBJECT VEHICLE ON THE FREEWAY WHEN SHE NOTICED THE VEHICLE WAS SMOKING AND THAT THE MIL WAS ACTIVATED AND FLASHING.

2 Summary

All four coils exhibit a very high level of damage meaning that a reliable conclusion about the damage is no longer possible.

The x-ray shows a destroyed RC link on the printed circuit of coil '-4'. This could be evidence that a part fault in the RC link lead to an increased current flow through coil '-4' and therefore could have been the cause for the corrosion event.

An external thermal effect on the ignition coils can also not be ruled out as the cause of the damage.

3 Individual results

- **Visual inspection**

Image 1: coil top view

-1 -2 -3 -4

Image 2: coil head top view

- **Electrical alignment**

Because of the destruction of the coils it is not possible to carry out electrical checks.

- **Radioscopy**

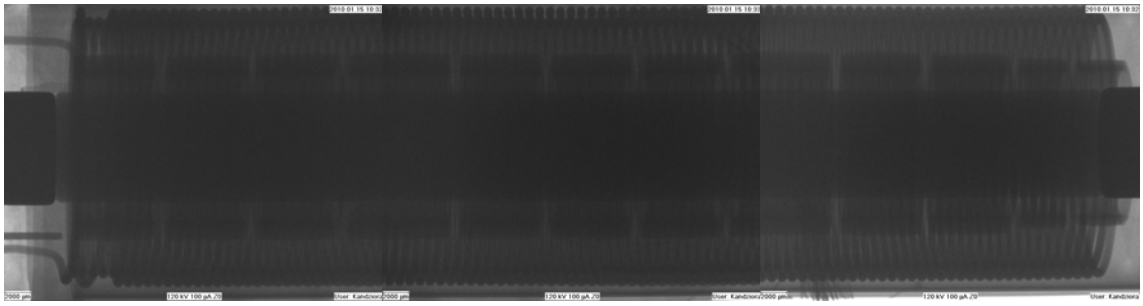


Image 3: coil system -1, not stretched

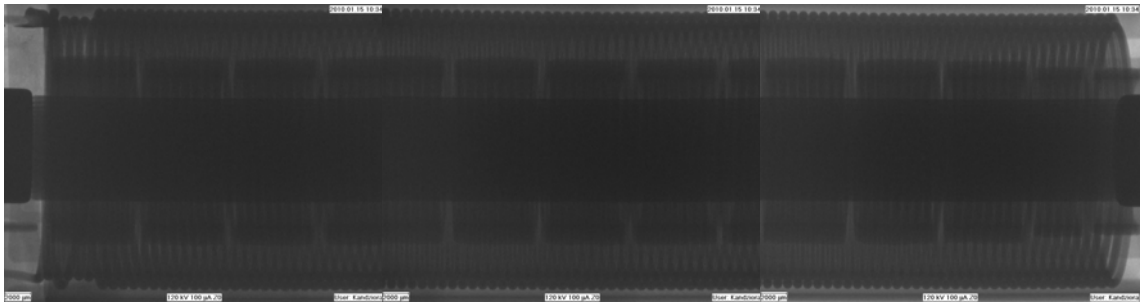


Image 4: coil system -2, not stretched

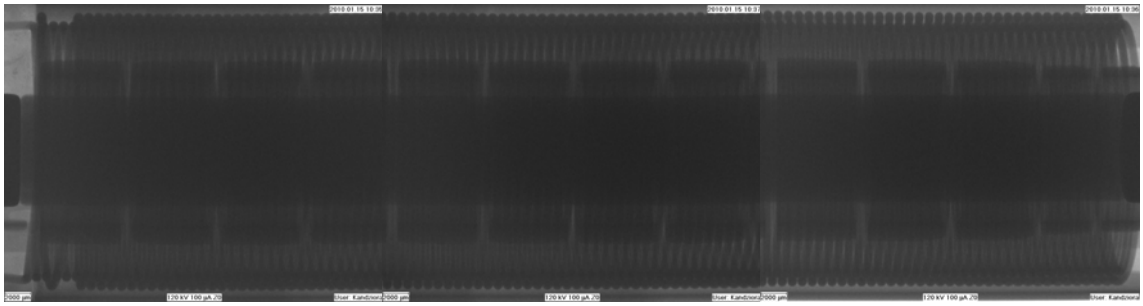


Image 5: coil system -3, not stretched

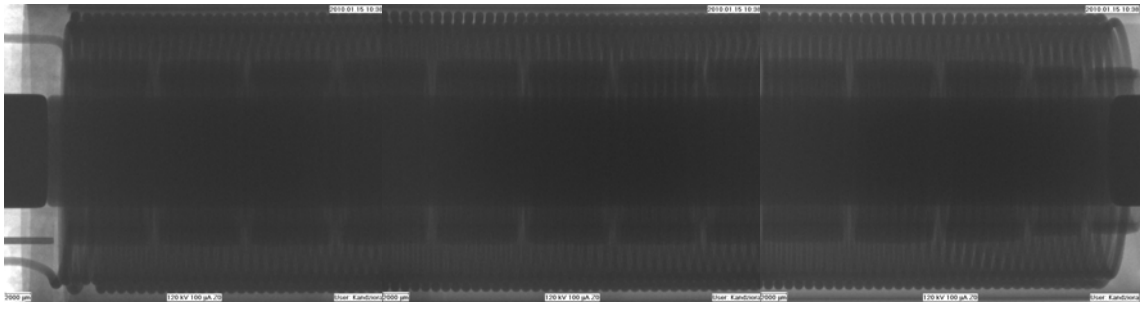


Image 6: coil system -4, not stretched

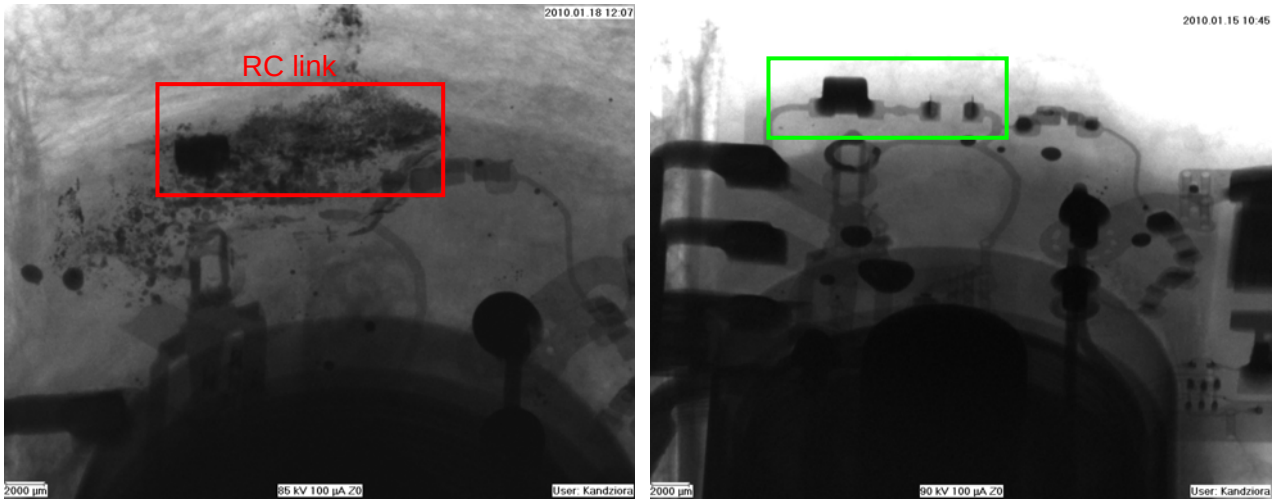


Image 7: printed circuit '-4', RC link damaged **'-1'-> OK, exemplarily also for '-2' and '-3'**

Image 8: printed circuit -4, area of the RC link

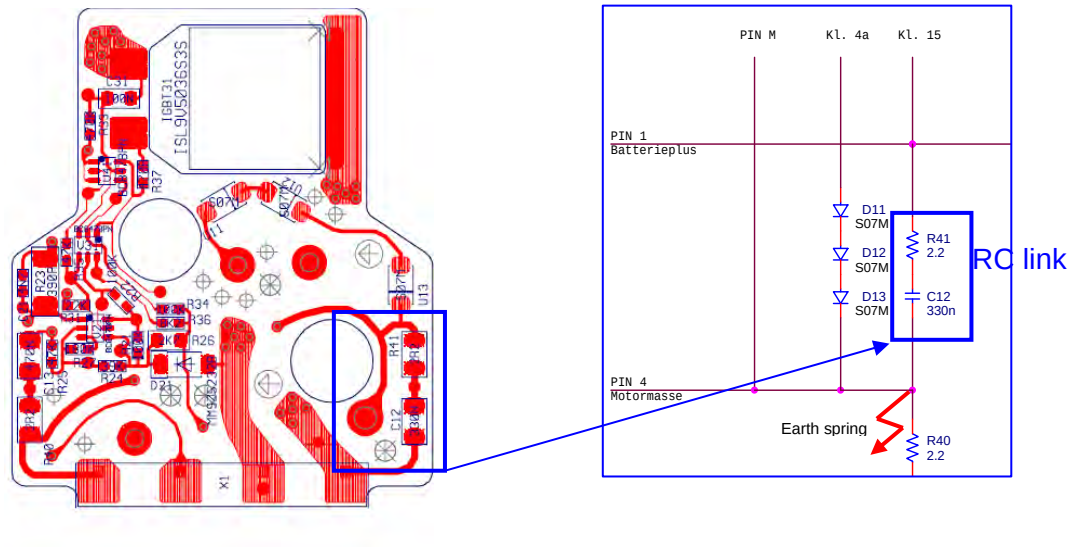


Image 9: printed circuit layout and cut of the switch.

4 Processing

The results of these investigations were carried out with the help of IAV employees. The x-ray investigation was carried out on the Phoenix Nanomex 160NF. The individual results and machine parameters can be viewed in GQL-LM/5. The coils are available for further analyses at GQL-LM/5.

Stabzündspule aus dem Markt USA, WVWAK93C78P083339

	Entwurf		Zwischenbericht Nr.	x	Abschlussbericht	Anzahl Zwischenberichte:

Teilenummer	Benennung	Zeichnungsdatum	Lieferant	Note
.06F.105.115.F	Stabzündspule		Pulse	-

1 Aufgabenstellung

Bitte Stabzündspulen in gewohnter Weise analysieren; es sind leider nur drei der vier Spulen verfügbar.

VIN: WVWAK93C78P083339, Passat B6

Motorkennbuchstabe: BPY = 2.0l TFSI mit 147kW

DoP Fahrzeug: 05.01.2008

DoP Spule: KW 47-2007

Erstzulassung: 02.01.2009

Ausfalldatum: 22.10.2009

Kilometerstand: Unbekannt

Fehleransprache des Kunden: Fire damage to the left side of the engine compartment, fire damage to to the hood, windshield damaged from heat.

Left side of front bumper cover is dented, right front wheel has scrapes

Zur Analyse wurden 3 Teile übergeben, 11-2009.11.17-f-008 bis -010

2 Zusammenfassung

Schadensursächlich ist die Spule 11-2009.11.17-f-010. Ein Defekt am RC-Glied hat zur thermischen Überlastung der stromführenden Kontakte (Pin1) und in der Folge zur Schädigung des Spulenkopfes geführt.

Die beiden anderen Spulen sind durch die entstehende Wärme mitgeschädigt worden. Alle drei Spulen entsprechen dem Baustand Pulse R2. Das Fertigungsdatum ist nur bei der Spule 11-2009.11.17-f-008 ablesbar: KW47 / 2007

Das Schadensbild ist aus älteren Analysen von Pulse R2-Spulen bekannt.

Bildablage:

3 Einzelergebnisse

- **Optische Begutachtung**

Abbildung 1: Teile Übersicht

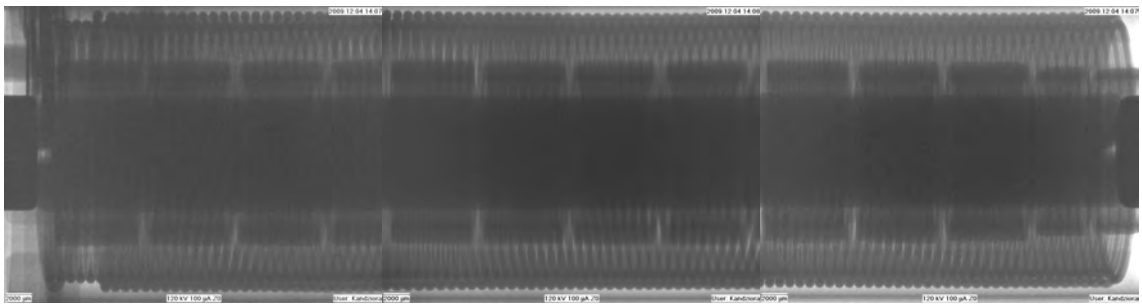
Abbildung 2: Teile Übersicht, Draufsicht

Spulenkopf Draufsicht **Stecker Anschluss**
Abbildung 3: 11-2009.11.17-f-010

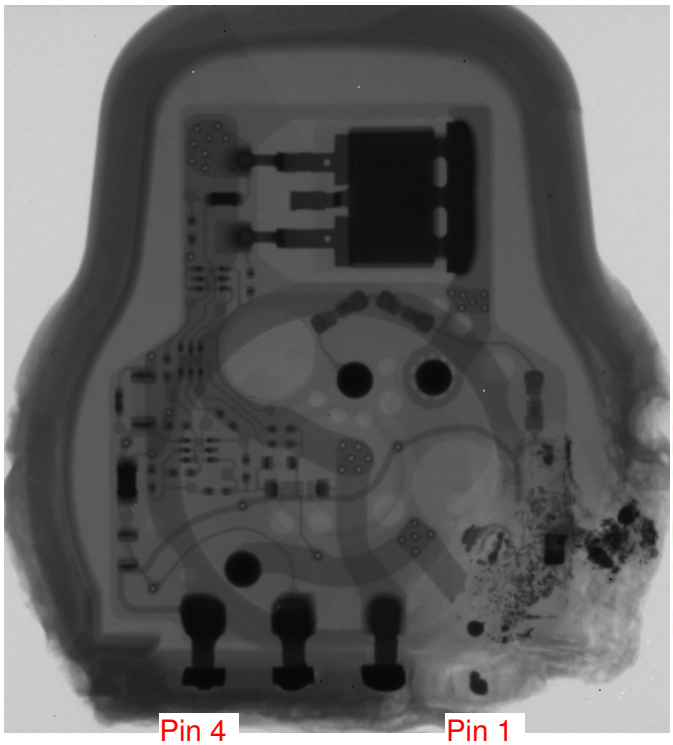
- **Elektrische Vermessung**

Spule -008 ist elektrisch i.O.
Bei den anderen beiden Spulen ist es auf Grund der Zerstörung nicht möglich eine elektrische Prüfung durchzuführen.

- **Radioskopie**



0V **HV**
Abbildung 4: 11-2009.11.17-f-010, Spulensystem nicht gelängt



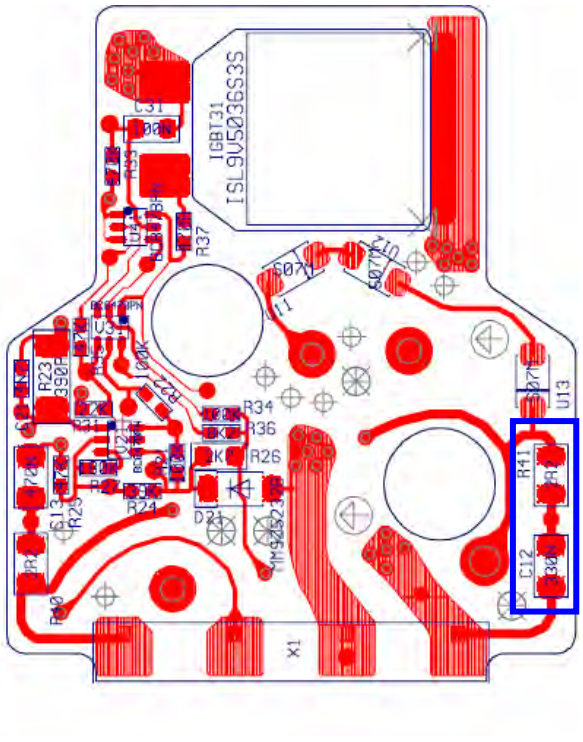
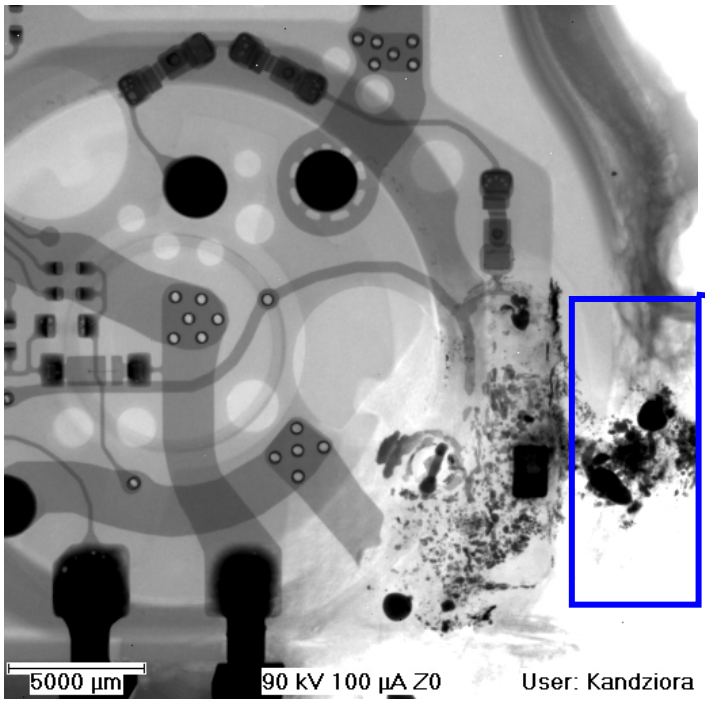
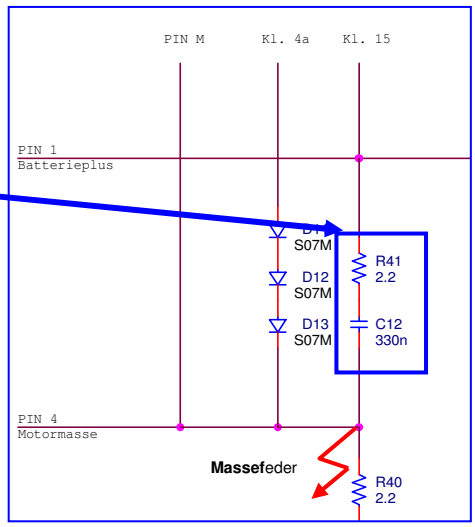


Abbildung 5: 11-2009.11.17-f-010, Platine **Platinen Layout**





Schaltplan, Teilausschnitt

Abbildung 6: 11-2009.11.17-f-010, Platine RC-Glied Bereich -> größte Zerstörung

4 Durchführung

Die Ergebnisse dieser Untersuchungen wurden unter der Mitwirkung von IAV - Mitarbeitern erzeugt. Die Röntgendurchstrahlungsuntersuchung wurde an der Phönix Nanomex 160NF durchgeführt. Die Einzelergebnisse und Maschinenparameter können bei GQL-LM/5 eingesehen werden. Die Spulen stehen bei GQL-LM/5 für weitere Analysen zur Verfügung.

Ignition coil from the USA market, WVWAK93C78P083339

	Draft		Interim report no.	x	Final report	Number of interim reports:

Part number	Designation	Drawing date	Supplier	Score
.06F.105.115.F	Ignition coil		Pulse	-

1 Task

Please analyse the ignition coils in the usual way; unfortunately only three of the four coils are available.

VIN: WVWAK93C78P083339, Passat B6

Engine code: BPY = 2.0l TFSI with 147kW

DoP vehicle: 05.01.2008

DoP coil: CW 47-2007

First registration: 02.01.2009

Date of failure: 22.10.2009

Kilometre reading: Unknown

Faults according to the customer: Fire damage to the left side of the engine compartment, fire damage to the hood, windshield damaged from heat.

Left side of front bumper cover is dented, right front wheel has scrapes

Three parts were transferred for analysis, 11-2009.11.17-f-008 to -010

2 Summary

Coil 11-2009.11.17-f-010 was the cause. A fault on the RC link lead to the overheating of the conducting contacts (Pin1) and lead to the damage of the coil head.

Both the other coils were damaged as well due to the heat created. All three coils are from version Pulse R2. The production date can only be read on coil 11-2009.11.17-f-008: CW47 / 2007

The symptoms are known from older analyses of Pulse R2 coils.

Image file:

3 Individual results

- **Visual inspection**

11-2009.11.17-f-010 -009 -008

Image 1: parts overview

11-2009.11.17-f-010 -009 -008

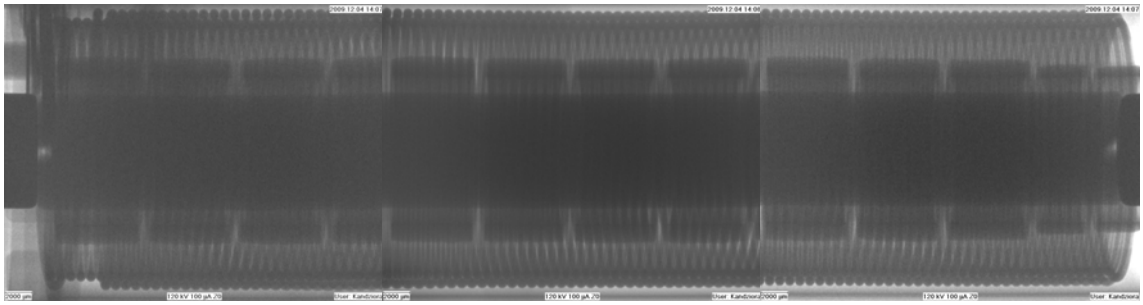
Image 2: parts overview, top view

coil head top view **Plug connection**
Image 3: 11-2009.11.17-f-010

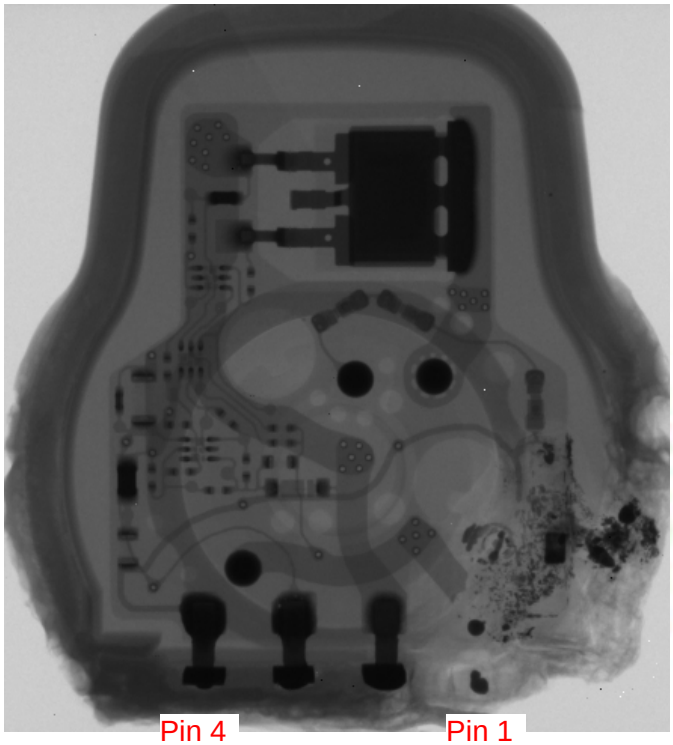
- **Electrical alignment**

Coil -008 is electrically OK.
It is not possible to carry out an electrical check on the other two coils because of their destruction.

- **Radioscopy**



0V **HV**
Image 4: 11-2009.11.17-f-010, coil system not stretched



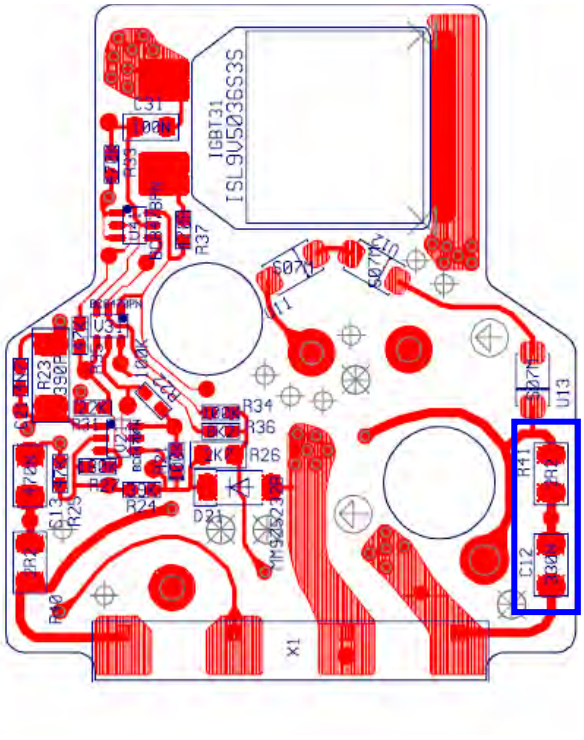
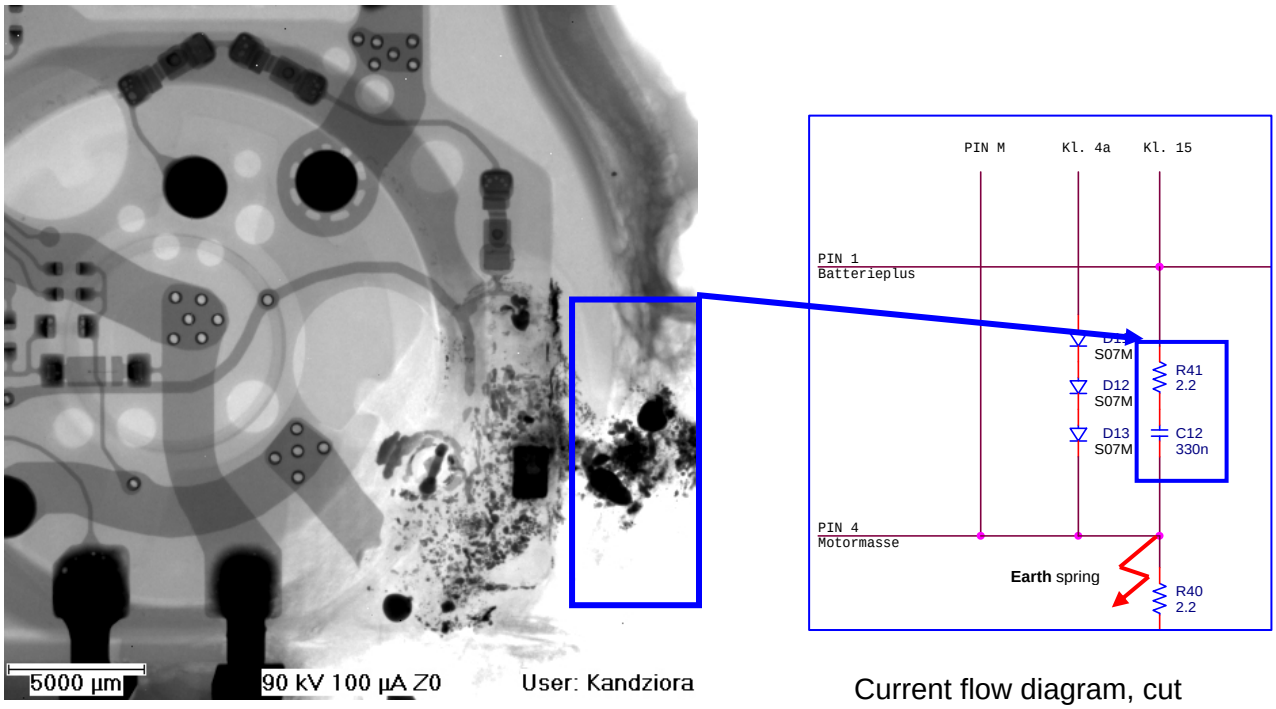


Image 5: 11-2009.11.17-f-010, printed circuit **Printed circuit layout**



Current flow diagram, cut

Image 6: 11-2009.11.17-f-010, RC link area printed circuit -> most destruction

4 Processing

The results of these investigations were carried out with the help of IAV employees. The x-ray investigation was carried out on the Phoenix Nanomex 160NF. The individual results and machine parameters can be viewed in GQL-LM/5. The coils are available for further analyses at GQL-LM/5.

Stabzündspule aus TREAD report

	Entwurf		Zwischenbericht Nr.	x	Abschlussbericht	Anzahl Zwischenberichte:	
Teilenummer	Benennung		Zeichnungsdatum	Lieferant			Note
06F 905 115 F	Stabzündspule			Pulse			-

1 Aufgabenstellung

Bitte Stabzündspule in bewährter Form analysieren. Die Spule wurde im Rahmen des TREAD reports Q3-2009 der Behörde als Schadens verursachendes Bauteil für einen Totalverlust gemeldet.

VIN: WVWLK93C08E052602

Fahrzeug: Passat B6, 2.0l, 147 kW

DoP Fahrzeug: 27.07.2007

Erstzulassung: 26.02.2008

Ausfalldatum: 17.09.2009

Kilometerstand: 27.236 Meilen

Kundenangabe: Customer was driving and thought the car was overheating. They pulled over, opened the hood and noticed smoke. Not long after, they noticed flames and the fire department was called. Customer states he thinks the fire originated from the transmission area. Vehicle is totaled and is with the insurance company.

2 Zusammenfassung

Ein Defekt am RC-Glied hat zur thermischen Überlastung der stromführenden Kontakte (Pin1) und in der Folge zur Schädigung des Spulenkopfes geführt. Das Fertigungsdatum der Spule ist nicht mehr ablesbar, es handelt sich um eine Spule der Generation R2-Spule.

Das Schadensbild ist aus älteren Analysen von Pulse R2-Spulen bekannt.

3 Einzelergebnisse

- **Optische Begutachtung**

Abbildung 1:Übersicht

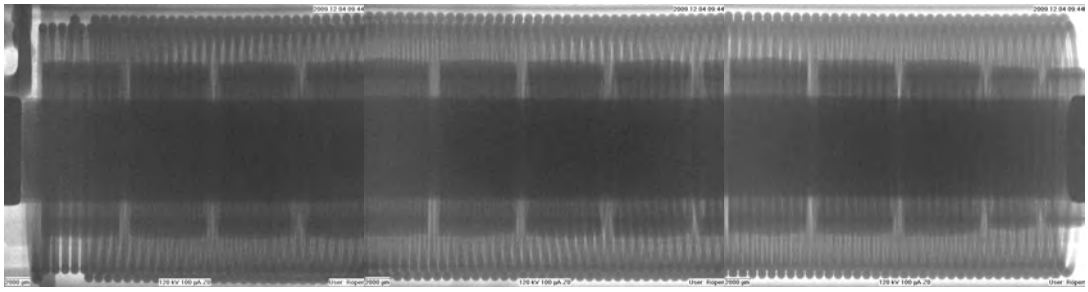
Bildablage:

Abbildung 2: Spulenkopf, Pin1 (Batt. +) abgeschmort von der Spule.

- **Elektrische Vermessung**

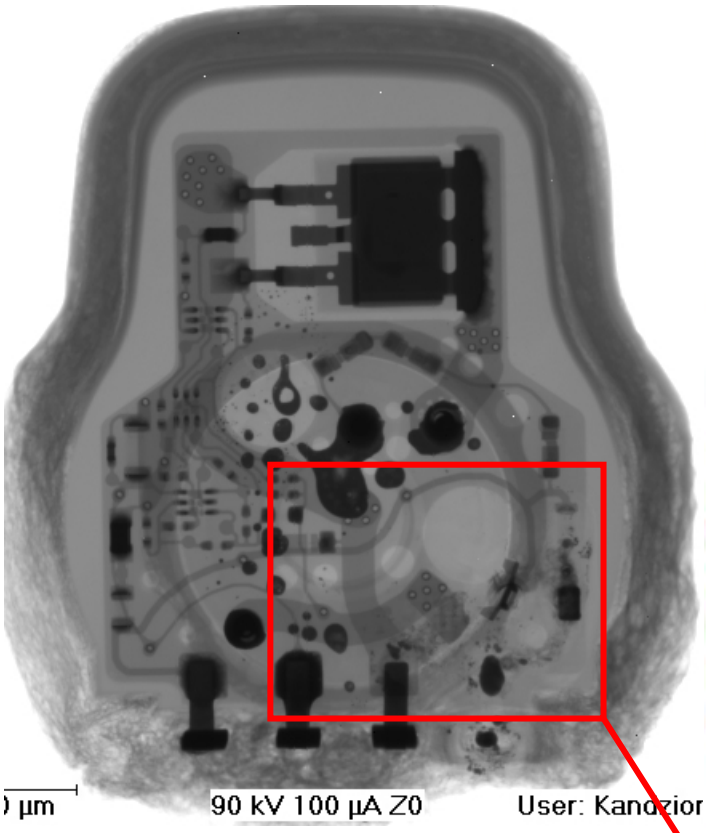
Auf Grund der Zerstörung ist es nicht möglich bei der Spule eine elektrische Prüfung durchzuführen.

- **Radioskopie**



0V **HV**

Abbildung 3: Spulensystem -> nicht gelängt



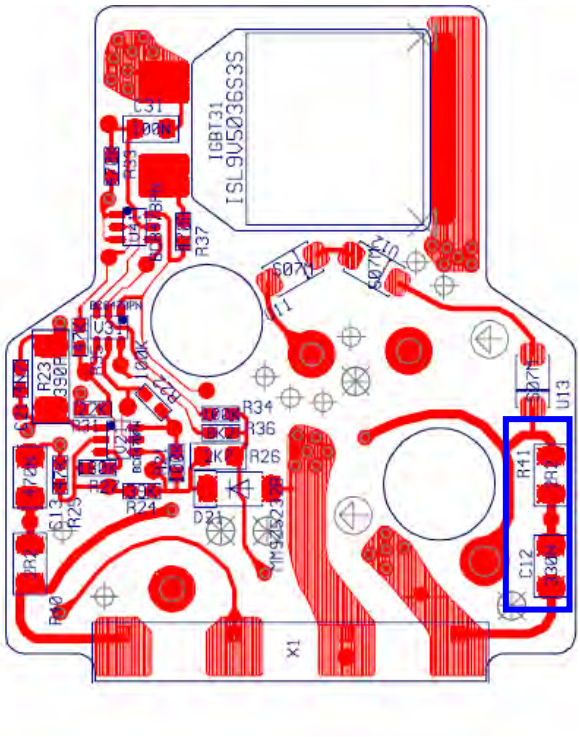
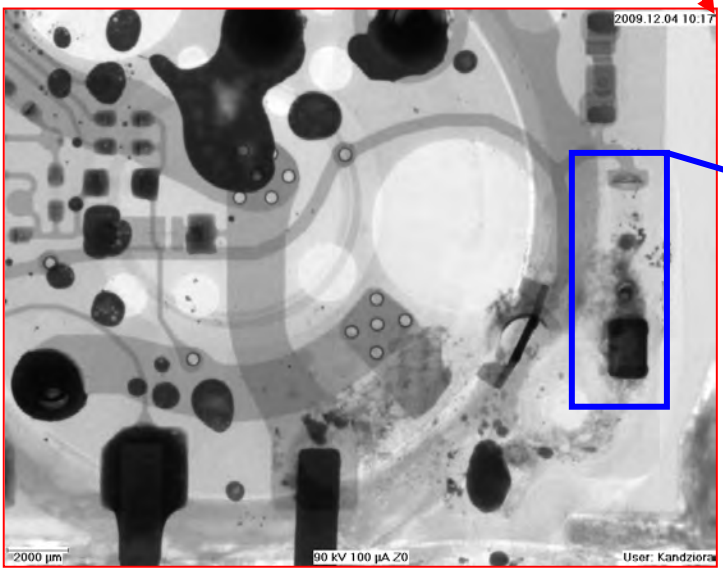


Abbildung 4: Platinen Ansicht **Platinen Layout (R2)**



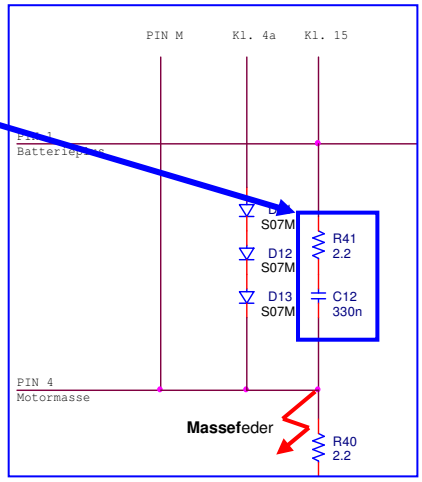


Abbildung 5: Platine, Bereich des RC-Gliedes **Teilausschnitt der Schaltung (R2)**

Abbildung 6: Platine, RC-Glied Bereich mit Massefeder: Teilzerstörung der Massefeder in der Leiterplatten-Bohrung.

4 Durchführung

Die Ergebnisse dieser Untersuchungen wurden unter der Mitwirkung von IAV - Mitarbeitern erzeugt. Die Röntgendurchstrahlungsuntersuchung wurde an der Phönix Nanomex 160NF durchgeführt. Die Einzelergebnisse und Maschinenparameter können bei GQL-LM/5 eingesehen werden. Die Spule steht bei GQL-LM/5 für weitere Analysen zur Verfügung.

Ignition coil from the TREAD report

	Draft		Interim report no.	x	Final report	Number of interim reports:

Part number	Designation	Drawing date	Supplier	Score
06F 905 115 F	Ignition coil		Pulse	-

1 Task

Please analyse ignition coil in tried and tested way. The coil was reported as the part that caused the damage in a total loss, according to the Q3-2009 TREAD report of the authorities.

VIN: WVWLK93C08E052602

Vehicle: Passat B6, 2.0l, 147 kW

DoP vehicle: 27.07.2007

First registration: 26.02.2008

Date of failure: 17.09.2009

Kilometre reading: 27,236 miles

Customer statement: Customer was driving and thought the car was overheating. They pulled over, opened the hood and noticed smoke. Not long after, they noticed flames and the fire department was called. Customer states he thinks the fire originated from the transmission area. Vehicle is totaled and is with the insurance company.

2 Summary

A fault on the RC link lead to the overheating of the conducting contacts (Pin1) and lead to the damage of the coil head. The production date of the coil can no longer be read, it is a coil from the R2 coil generation.

The symptoms are known from older analyses of Pulse R2 coils.

3 Individual results

- **Visual inspection**

Image 1:overview

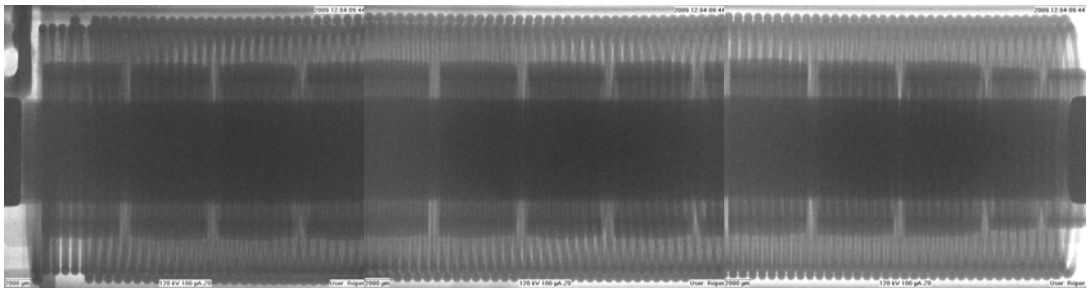
Image file:

Image 2: coil head, Pin1 (batt. +) shorn off from the coil.

- **Electrical alignment**

Because of the destruction it is not possible to carry out an electrical check on the coil.

- **Radioscopy**



0V **HV**
Image 3: coil system -> not stretched

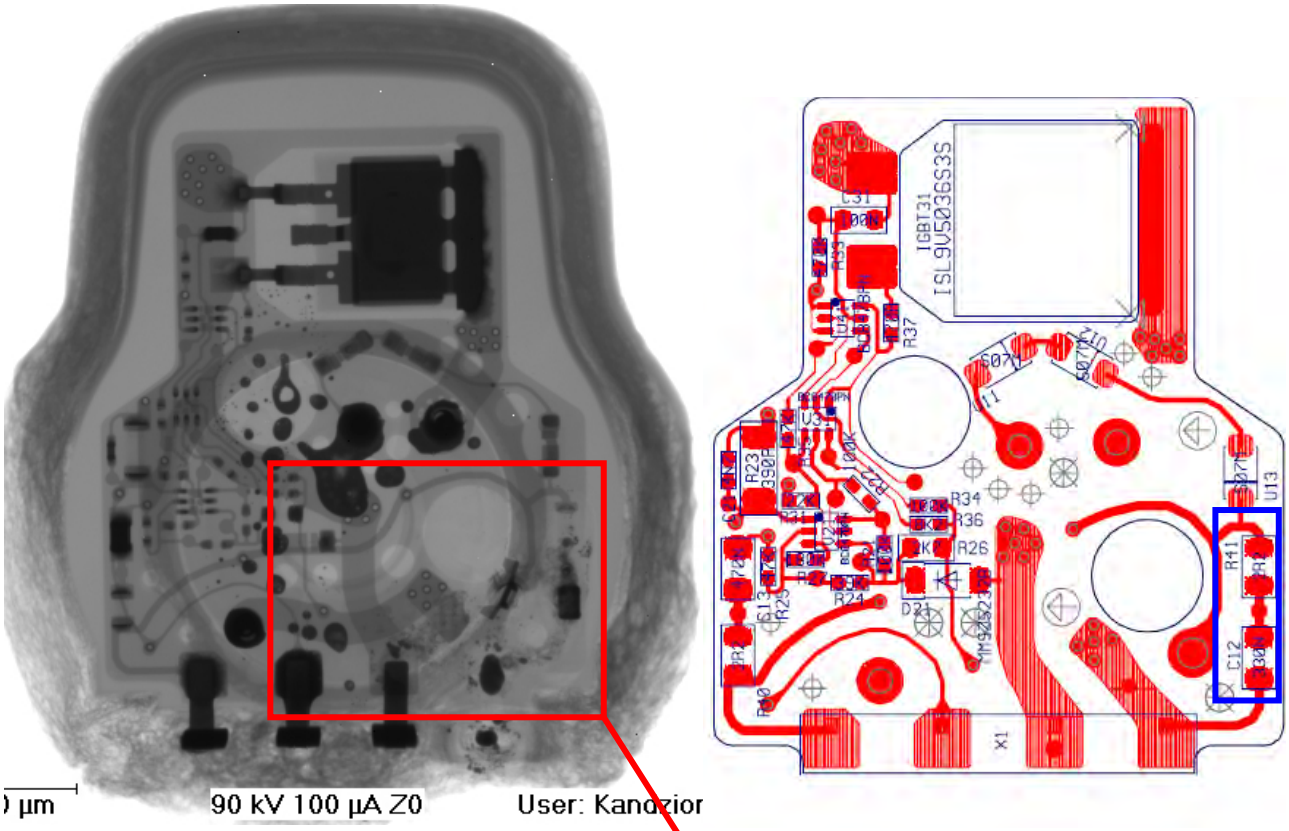


Image 4: printed circuit view **printed circuit layout (R2)**

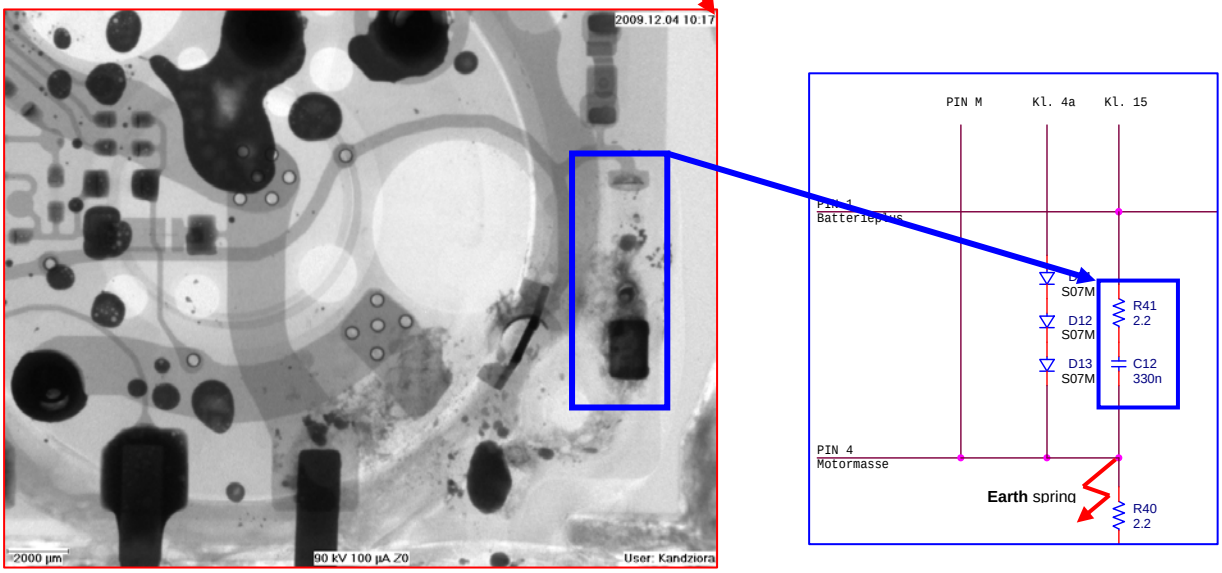


Image 5: printed circuit, area of the RC link **cut of the switch (R2)**

Image 6: printed circuit, RC link area with earth spring: partial destruction of the earth spring in the printed circuit hole.

4 Processing

The results of these investigations were carried out with the help of IAV employees. The x-ray investigation was carried out on the Phoenix Nanomex 160NF. The individual results and machine parameters can be viewed in GQL-LM/5. The coil is available for further analyses at GQL-LM/5.

Stabzündspulen aus dem Markt USA

	Entwurf		Zwischenbericht Nr.	x	Abschlussbericht	Anzahl Zwischenberichte:

Teilenummer	Benennung	Zeichnungsdatum	Lieferant	Note
06F.905.115.F	Stabzündspule		Pulse	-

1 Aufgabenstellung

In den USA sind vier RK-Fälle im Rahmen der TREAD -Berichtserstattung der Behörde gemeldet worden. Es ist zu klären, ob die Stabzündspulen die Schäden verursacht haben:

Teile Nr.	VW Nr.	FZG VIN	FD Spule	FD FZG	Laufleistung
11-Z-10-02246_1	06F.905.115.F	WVWJK73C69P001221	xxx	23.05.2008	6000
11-Z-10-02246_2	06F.905.115.F	WVWJK73CX9E004389	2008/18	29.05.2008	25700
11-Z-10-02246_3	06F.905.115.F	WVWJK73CX9E004389	2008/18	29.05.2008	25700
11-Z-10-02246_4	06F.905.115.F	WVWJK73CX9E004389	2008/18	29.05.2008	25700
11-Z-10-02246_5	06F.905.115.F	WVWJK73CX9E004389	2008/18	29.05.2008	25700
11-Z-10-02246_6	06F.905.115.F	WVWHL73C79E510578	2008/21	22.07.2008	9800
11-Z-10-02246_7	06F.905.115.F	WVWHL73C79E510578	2008/21	22.07.2008	9800
11-Z-10-02246_8	06F.905.115.F	WVWHL73C79E510578	2008/21	22.07.2008	9800
11-Z-10-02246_9	06F.905.115.F	WVWHL73C79E510578	2008/21	22.07.2008	9800
11-Z-10-02246_10	06F.905.115.F	WVWHL73CX9E511725	xxx	01.07.2008	48000
11-Z-10-02246_11	06F.905.115.F	WVWHL73CX9E511725	xxx	01.07.2008	48000
11-Z-10-02246_12	06F.905.115.F	WVWHL73CX9E511725	xxx	01.07.2008	48000
11-Z-10-02246_13	06F.905.115.F	WVWHL73CX9E511725	xxx	01.07.2008	48000

2 Zusammenfassung

Schadensursächlich in dem FZG VIN_01221 war die Spule 11-Z-10-02246_1.

Schadensursächlich in dem FZG VIN_04389 war die Spule 11-Z-10-02246_2.

Schadensursächlich in dem FZG VIN_10578 war die Spule 11-Z-10-02246_7.

Schadensursächlich in dem FZG VIN_11725 war die Spule 11-Z-10-02246_10.

Bei allen vier Spulen hat ein Defekt am RC-Glied zur thermischen Überlastung der stromführenden Kontakte (Pin1 und Pin 2) und in der Folge zur Schädigung des Spulenkopfes geführt.

Der Keramikkondensator könnte im Herstellprozess mechanisch vorgeschädigt worden sein, diese Vorschädigung hat dann durch die im Betrieb auftretenden Temperaturwechsel zu einem niederohmigen Nebenschluss der Versorgungsspannung geführt.

3 Einzelergebnisse

- **Optische Begutachtung**

Abbildung 1: 11-z-10-02246_1

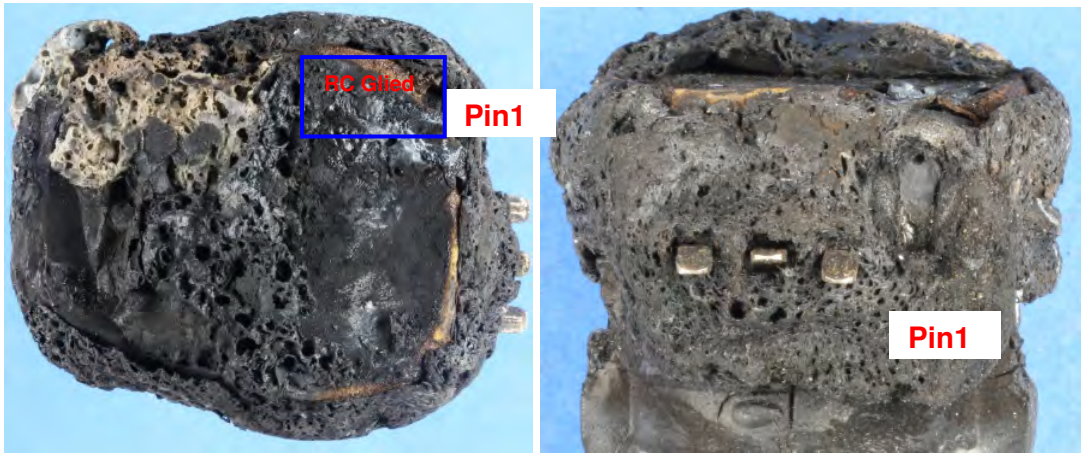


Abbildung 2: 11-z-10-02246_1

Abbildung 3: 11-z-10-02246_2 bis _5

Abbildung 4: 11-z-10-02246_2 bis _5

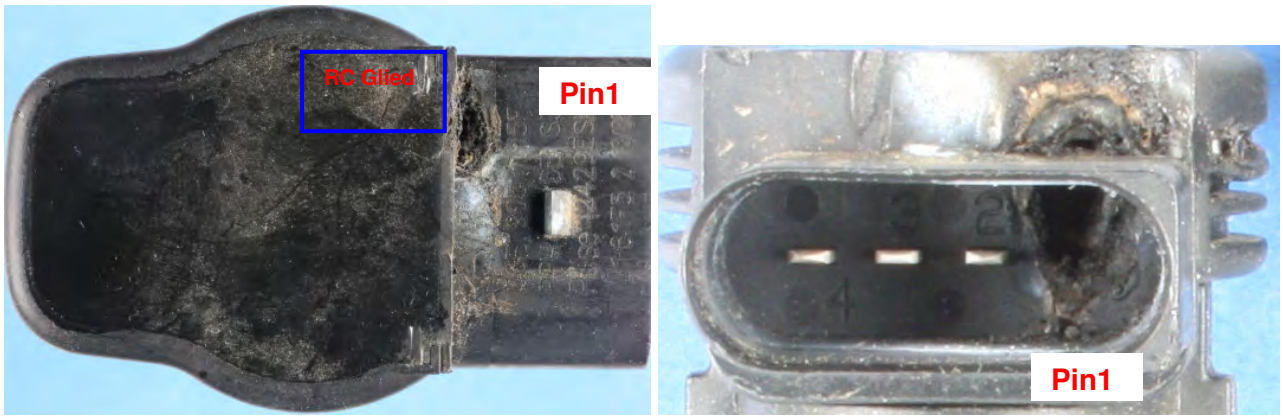


Abbildung 5: 11-z-10-02246_2, Schädigung des Spulenkopfes im Bereich des RC-Gliedes

Abbildung 6: 11-z-10-02246_6 bis _9

Abbildung 7: 11-z-10-02246_6 bis _9

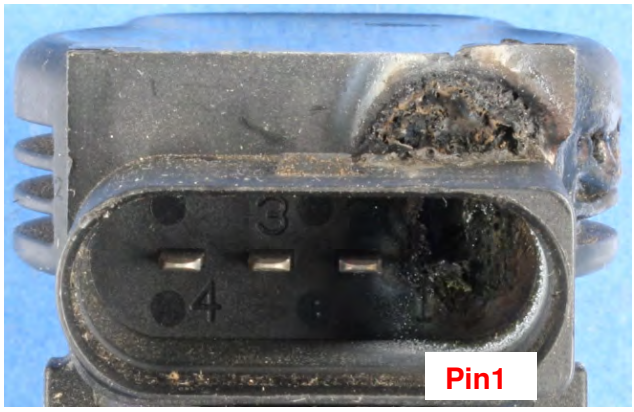


Abbildung 8: 11-z-10-02246_7, Schädigung des Spulenkopfes im Bereich des RC-Gliedes

Abbildung 9: 11-z-10-02246_10 bis _13

Abbildung 10: 11-z-10-02246_10 bis _13

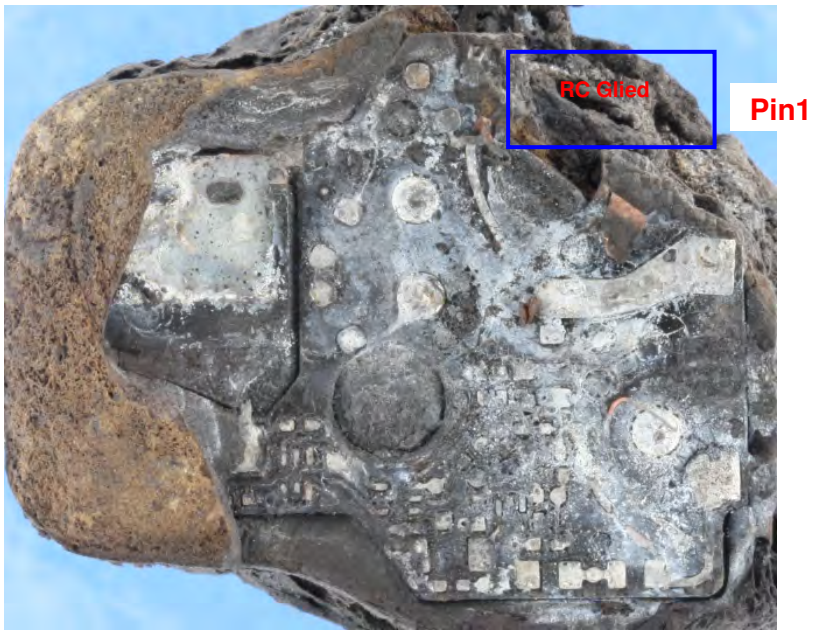


Abbildung 11: 11-z-10-02246_10, Schädigung des Spulenkopfes im Bereich des RC-Gliedes

- **Elektrische Vermessung**

Bei den Teilen 11-z-10-02246_1, _2, _7, _10, _11, _12, _12, _12 und _13 war aufgrund der thermischen Zerstörung die elektrische Vermessung nicht möglich.
Die Teile 11-z-10-02246_3, _4, _5, _6, _8, _8 und _9 sind elektrisch i.O.

- **Radioskopie**

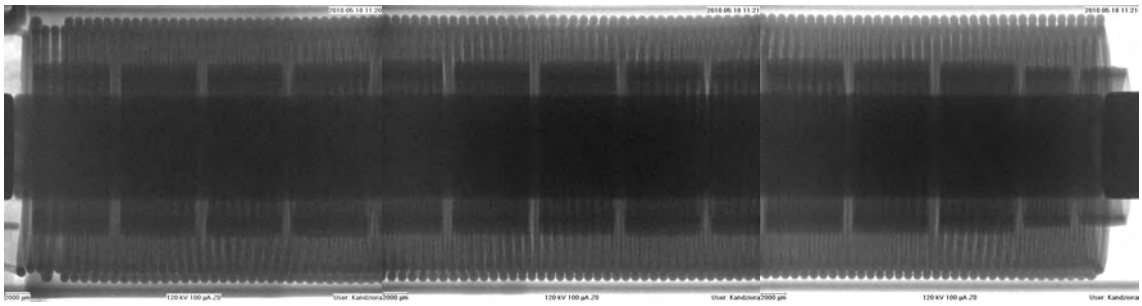


Abbildung 12: Spulensystem 11-z-10-02246_1, nicht gelängt.

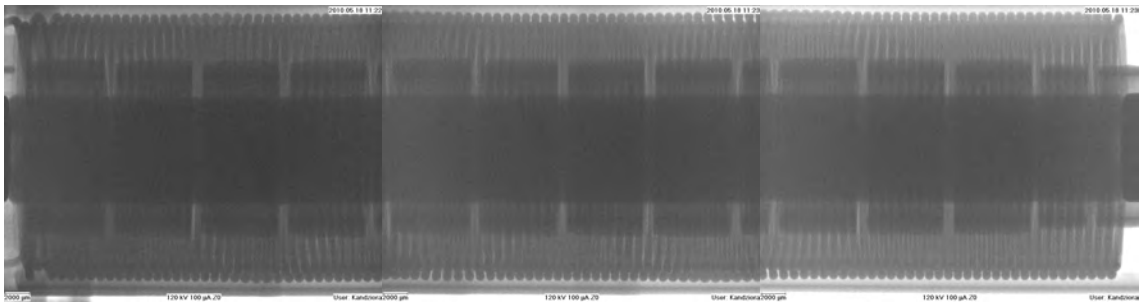


Abbildung 13: Spulensystem 11-z-10-02246_2, nicht gelängt.

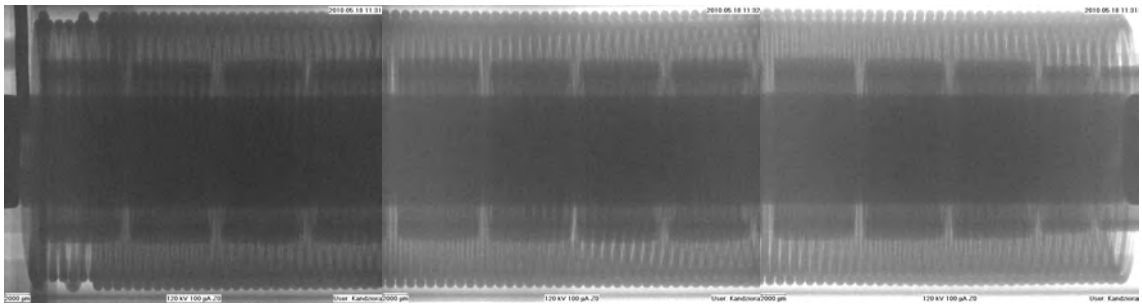


Abbildung 14: Spulensystem 11-z-10-02246_7, nicht gelängt.

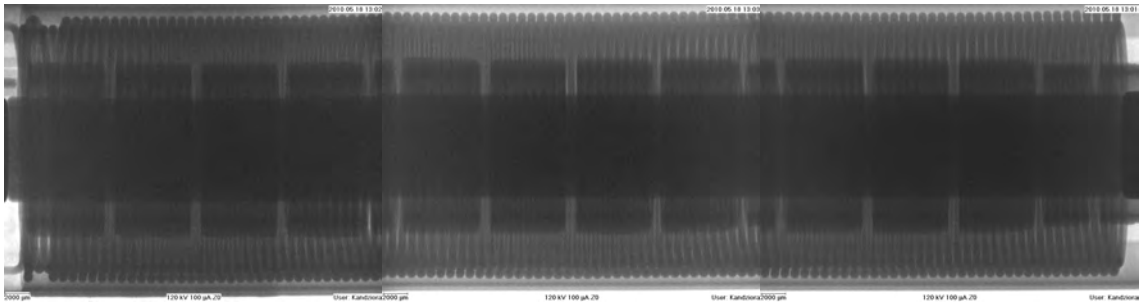


Abbildung 15: Spulensystem 11-z-10-02246_10, nicht gelängt.

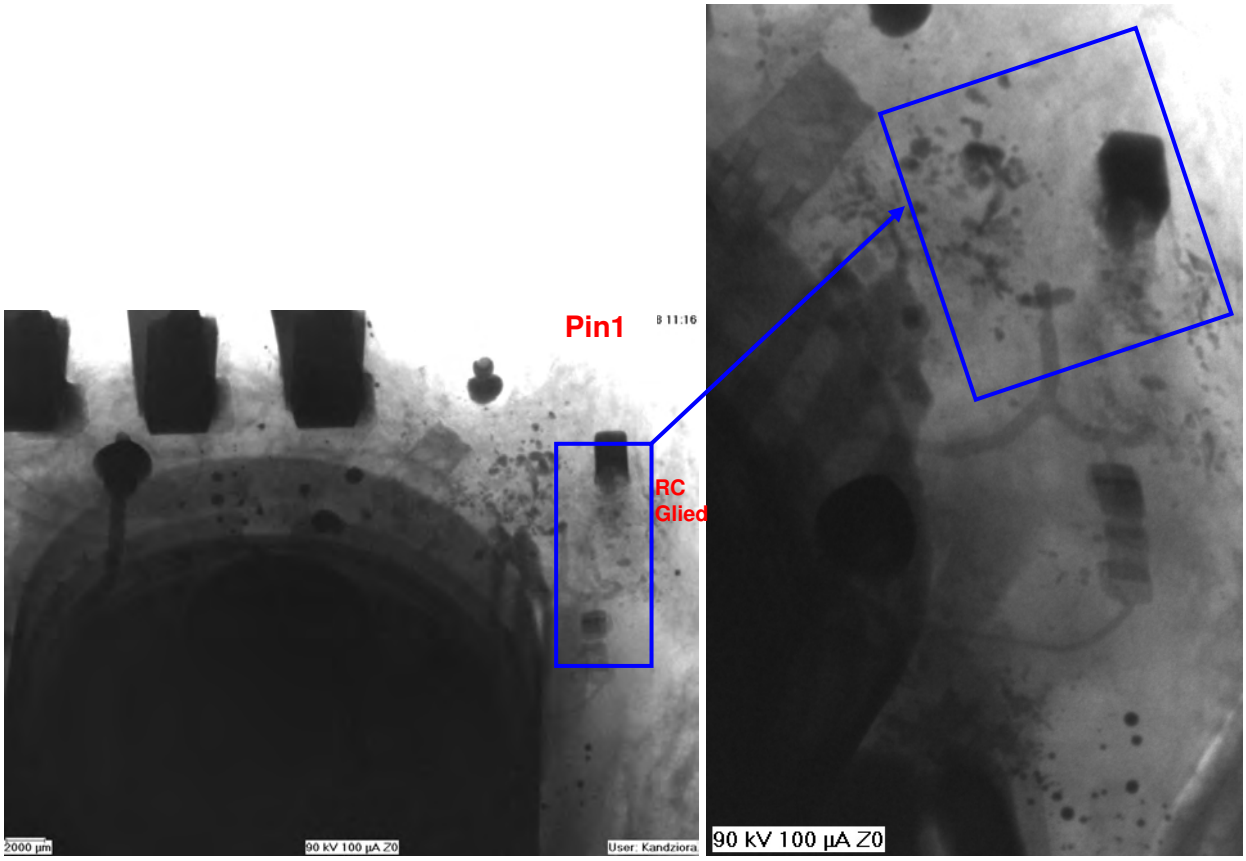


Abbildung 16: Leiterplatte 11-z-10-02246_1

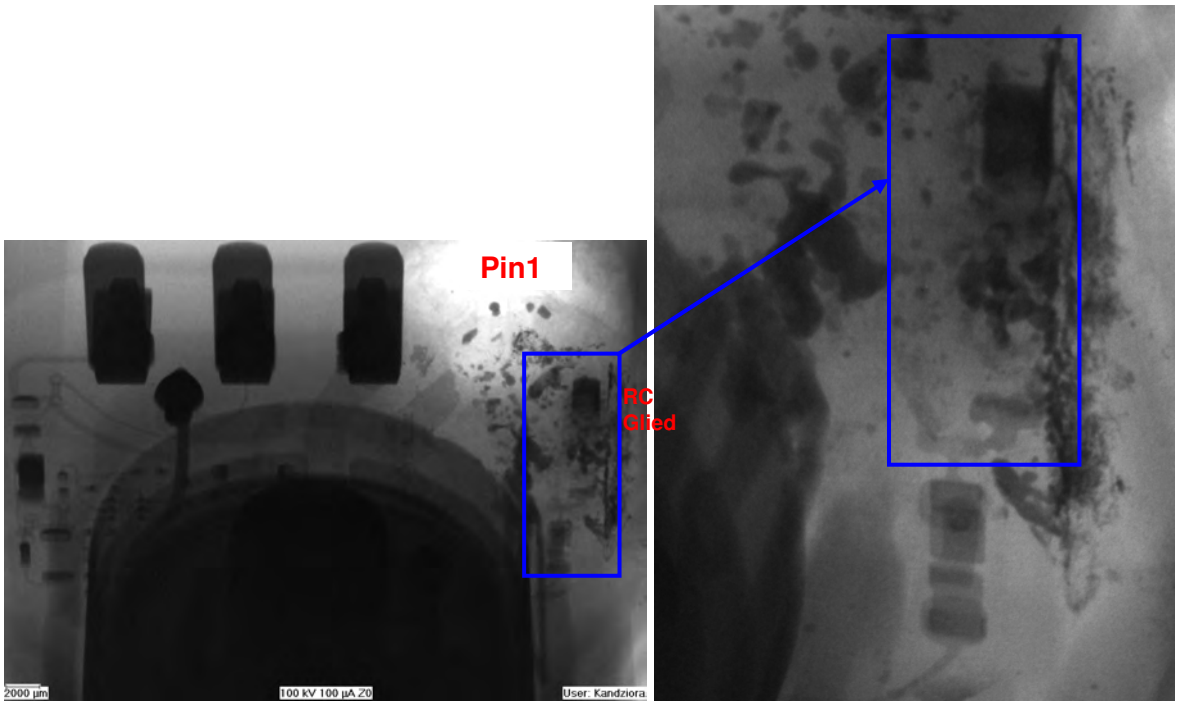


Abbildung 17: Leiterplatte 11-z-10-02246_2

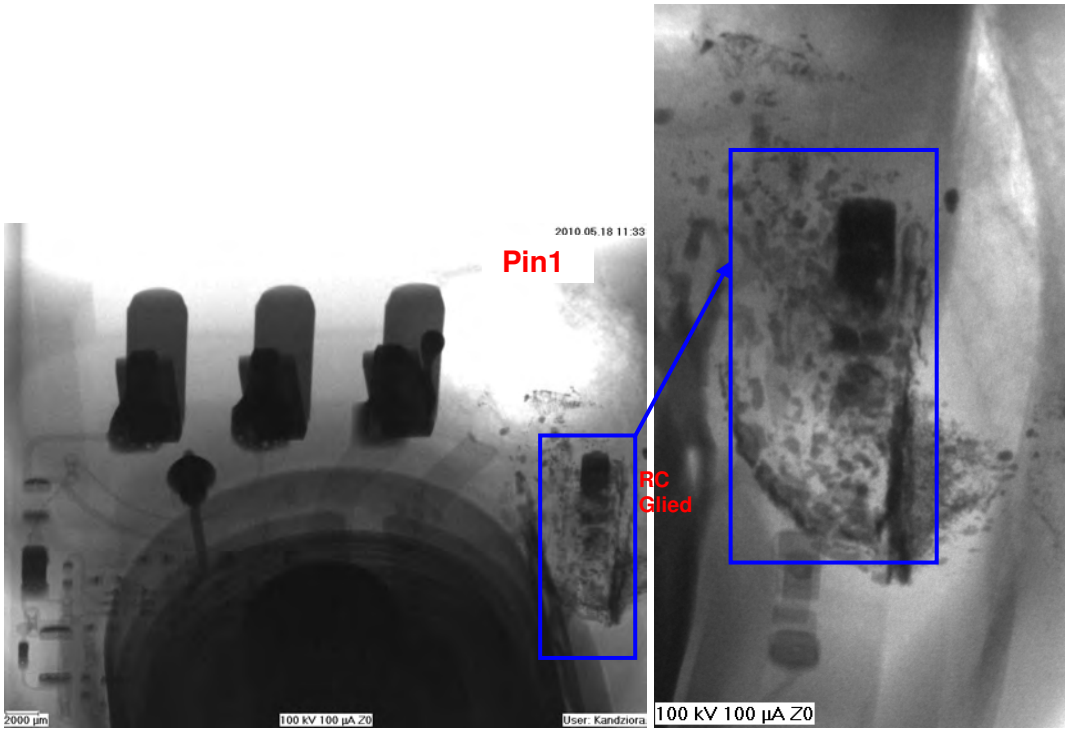


Abbildung 18: Leiterplatte 11-z-10-02246_7

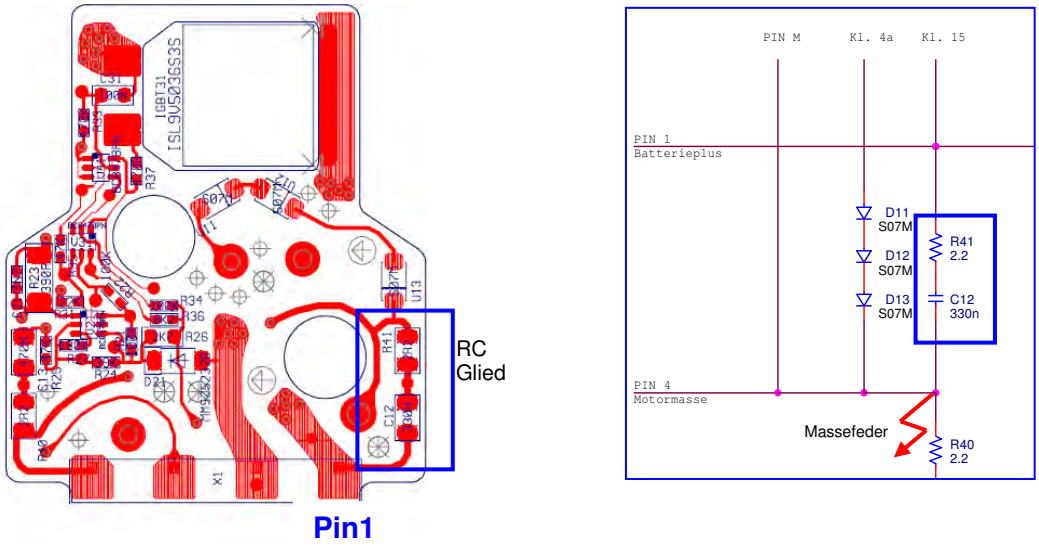


Abbildung 19: Leiterplatten Layout und Ausschnitt aus dem Schaltplan

4 Durchführung

Die Ergebnisse dieser Untersuchungen wurden unter der Mitwirkung von IAV - Mitarbeitern erzeugt. Die Röntgendurchstrahlungsuntersuchung wurde an der Phönix Nanomex 160NF durchgeführt. Die Einzelergebnisse und Maschinenparameter können bei GQL-LM eingesehen werden. Die Spulen stehen bei GQL-LM/5 für weitere Analysen zur Verfügung.

Ignition coils from the USA market

	Draft		Interim report no.	x	Final report	Number of interim reports:

Part number	Designation	Drawing date	Supplier	Score
06F.905.115.F	Ignition coil		Pulse	-

1 Task

Four RK cases have been notified in the USA as part of the TREAD reporting of the authority. It is to be cleared up whether the ignition coils caused the damage:

Part no.	VW no.	Vehicle VIN	FD coil	FD vehicle	Mileage
11-Z-10-02246_1	06F.905.115.F	WVWJK73C69P001221	xxx	23.05.2008	6000
11-Z-10-02246_2	06F.905.115.F	WVWJK73CX9E004389	2008/18	29.05.2008	25700
11-Z-10-02246_3	06F.905.115.F	WVWJK73CX9E004389	2008/18	29.05.2008	25700
11-Z-10-02246_4	06F.905.115.F	WVWJK73CX9E004389	2008/18	29.05.2008	25700
11-Z-10-02246_5	06F.905.115.F	WVWJK73CX9E004389	2008/18	29.05.2008	25700
11-Z-10-02246_6	06F.905.115.F	WVWHL73C79E510578	2008/21	22.07.2008	9800
11-Z-10-02246_7	06F.905.115.F	WVWHL73C79E510578	2008/21	22.07.2008	9800
11-Z-10-02246_8	06F.905.115.F	WVWHL73C79E510578	2008/21	22.07.2008	9800
11-Z-10-02246_9	06F.905.115.F	WVWHL73C79E510578	2008/21	22.07.2008	9800
11-Z-10-02246_10	06F.905.115.F	WVWHL73CX9E511725	xxx	01.07.2008	48000
11-Z-10-02246_11	06F.905.115.F	WVWHL73CX9E511725	xxx	01.07.2008	48000
11-Z-10-02246_12	06F.905.115.F	WVWHL73CX9E511725	xxx	01.07.2008	48000
11-Z-10-02246_13	06F.905.115.F	WVWHL73CX9E511725	xxx	01.07.2008	48000

2 Summary

The coil 11-Z-10-02246_1 was the cause of the damage in the vehicle VIN_01221.

The coil 11-Z-10-02246_2 was the cause of the damage in the vehicle VIN_04389.

The coil 11-Z-10-02246_7 was the cause of the damage in the vehicle VIN_10578.

The coil 11-Z-10-02246_10 was the cause of the damage in the vehicle VIN_11725.

In all four coils a fault on the RC link lead to the overheating of the conducting contacts (Pin 1 and Pin 2) and subsequently lead to the damage of the coil head.

The ceramic condenser could have been mechanically damaged in the production process, this damage then lead to a low resistance shunt circuit of the supply voltage due to a temperature change occurring during operation.

3 Individual results

- **Visual inspection**

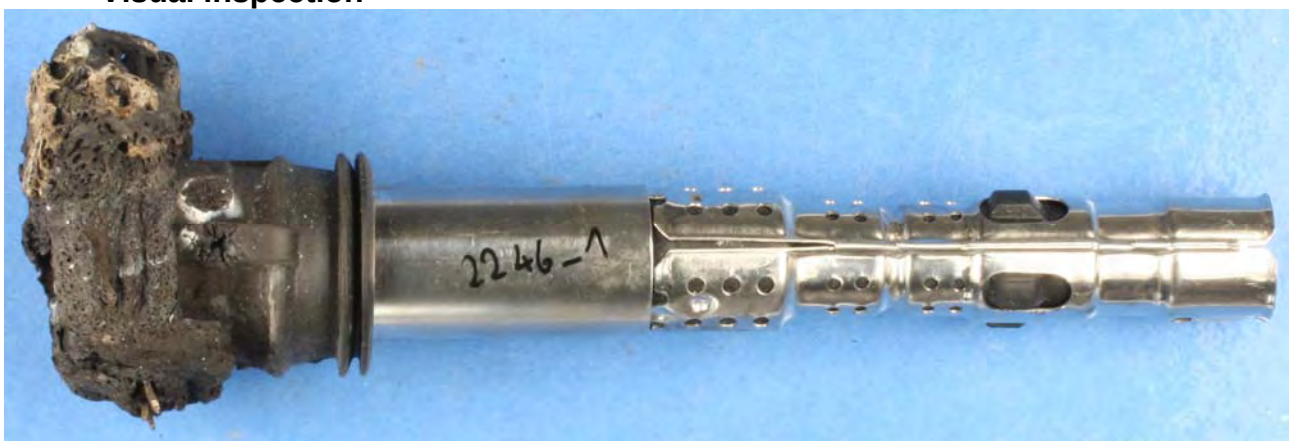


Image 1: 11-z-10-02246_1

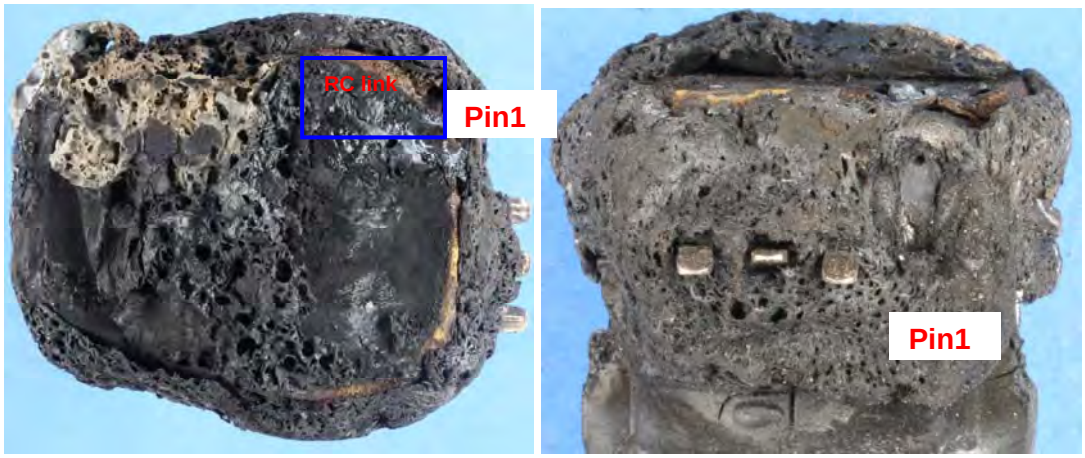


Image 2: 11-z-10-02246_1

Image 3: 11-z-10-02246_2 to _5

Image 4: 11-z-10-02246_2 to _5

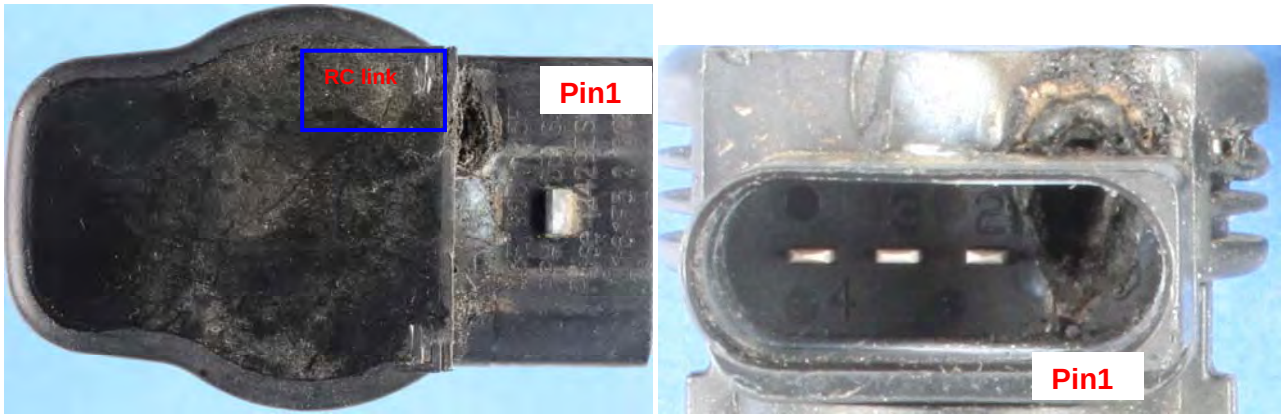


Image 5: 11-z-10-02246_2, damage to the coil head in the area of the RC link

Image 6: 11-z-10-02246_6 to _9

Image 7: 11-z-10-02246_6 to _9

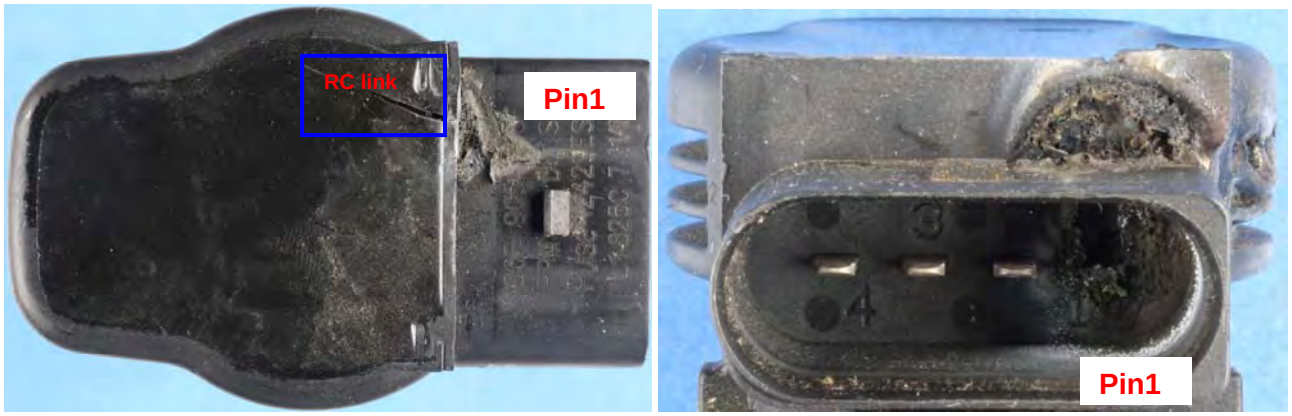


Image 8: 11-z-10-02246_7, damage to the coil head in the area of the RC link

Image 9: 11-z-10-02246_10 to _13

Image 10: 11-z-10-02246_10 to _13

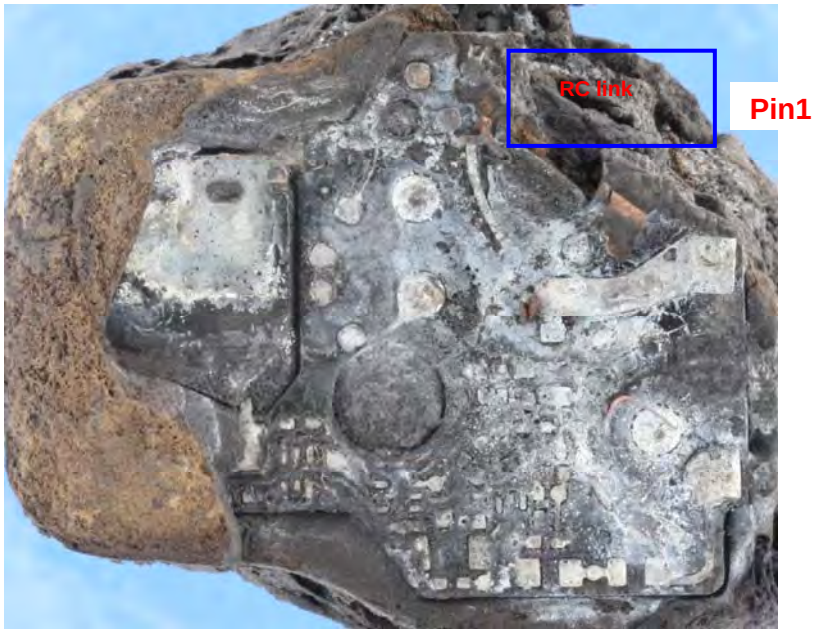


Image 11: 11-z-10-02246_10, damage to the coil head in the area of the RC link

- **Electrical alignment**

In parts 11-z-10-02246_1, _2, _7, _10, _11, _12, _12, _12 and _13 electrical alignment was not possible due to the thermal destruction.
The parts 11-z-10-02246_3, _4, _5, _6, _8, _8 and _9 are electrically OK

- **Radioscopy**

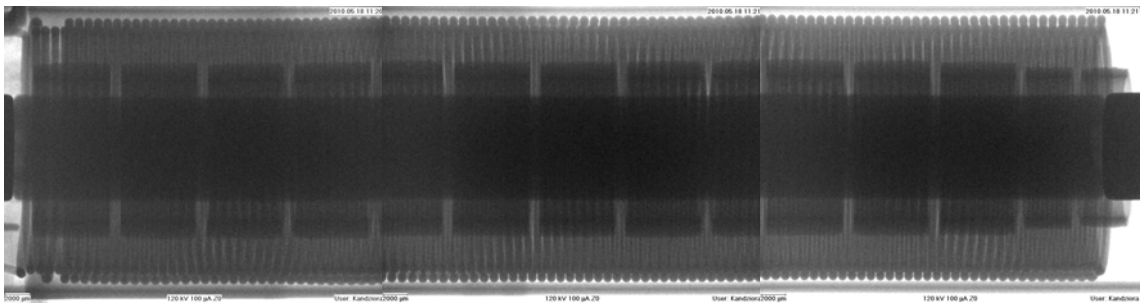


Image 12: coil system 11-z-10-02246_1, not stretched.

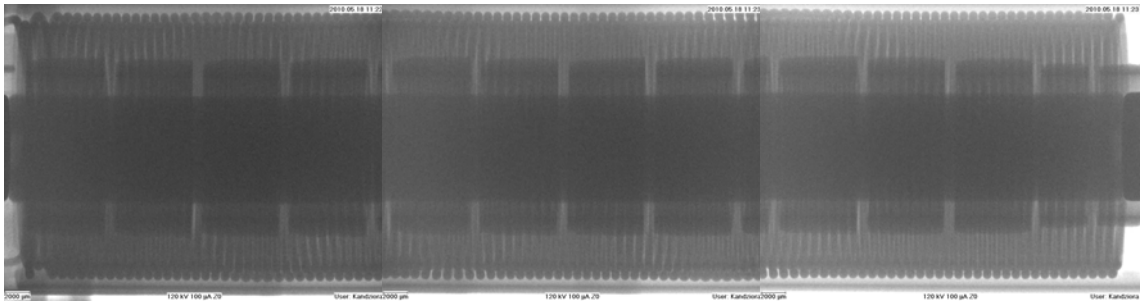


Image 13: coil system 11-z-10-02246_2, not stretched.

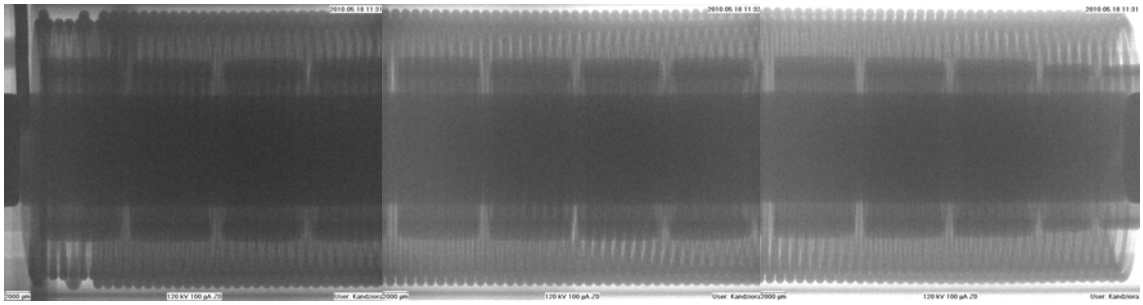


Image 14: coil system 11-z-10-02246_7, not stretched.

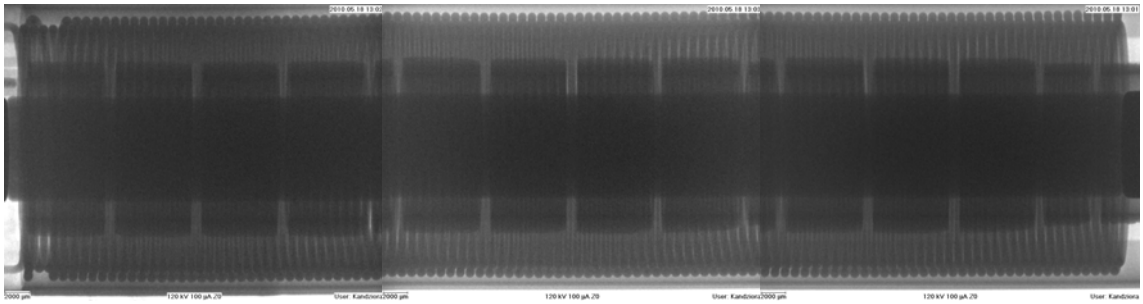


Image 15: coil system 11-z-10-02246_10, not stretched.

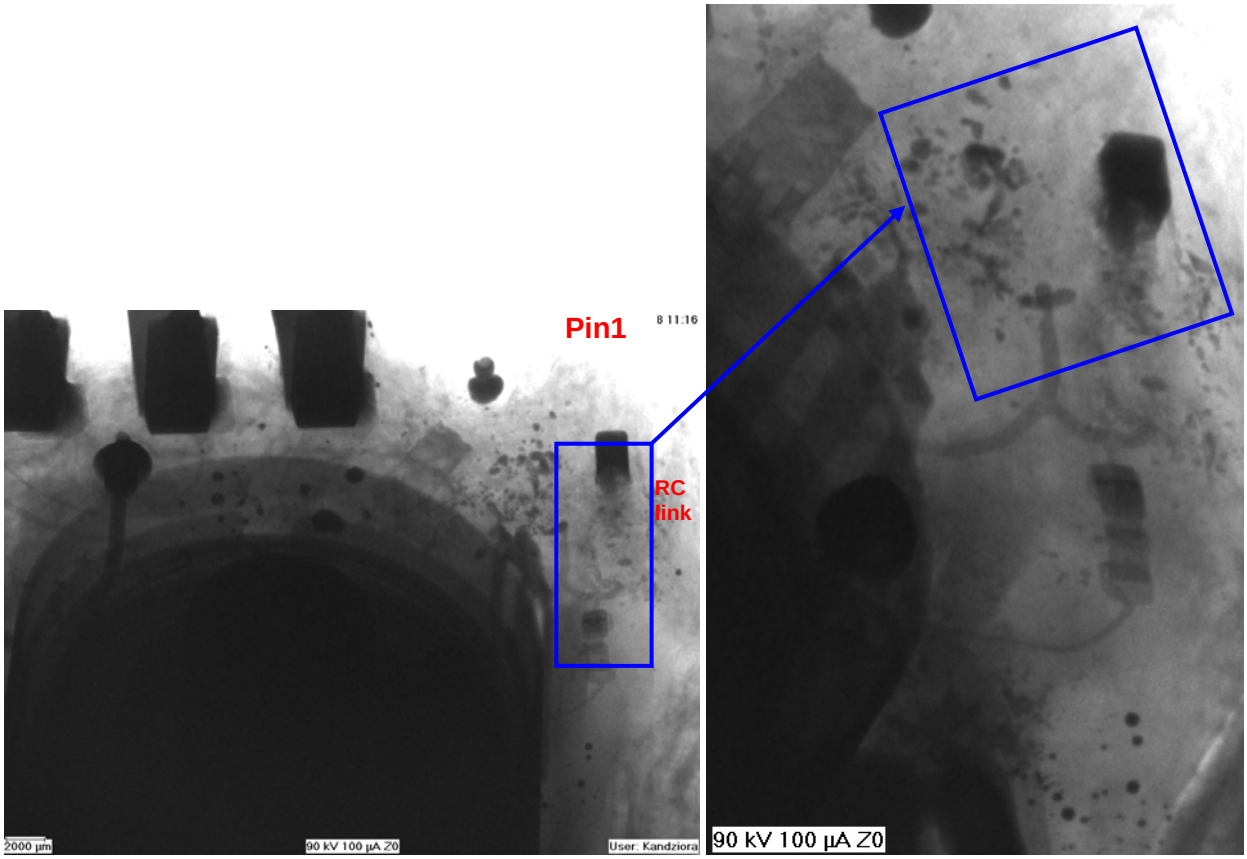


Image 16: printed circuit 11-z-10-02246_1

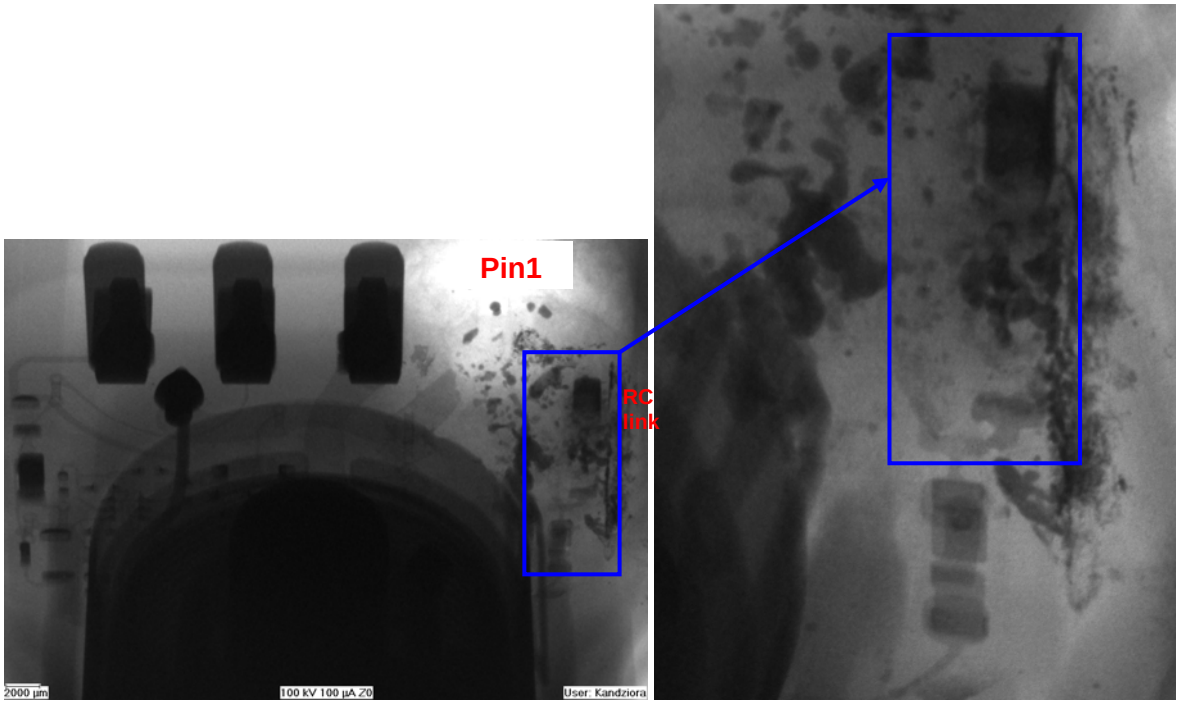


Image 17: printed circuit 11-z-10-02246_2

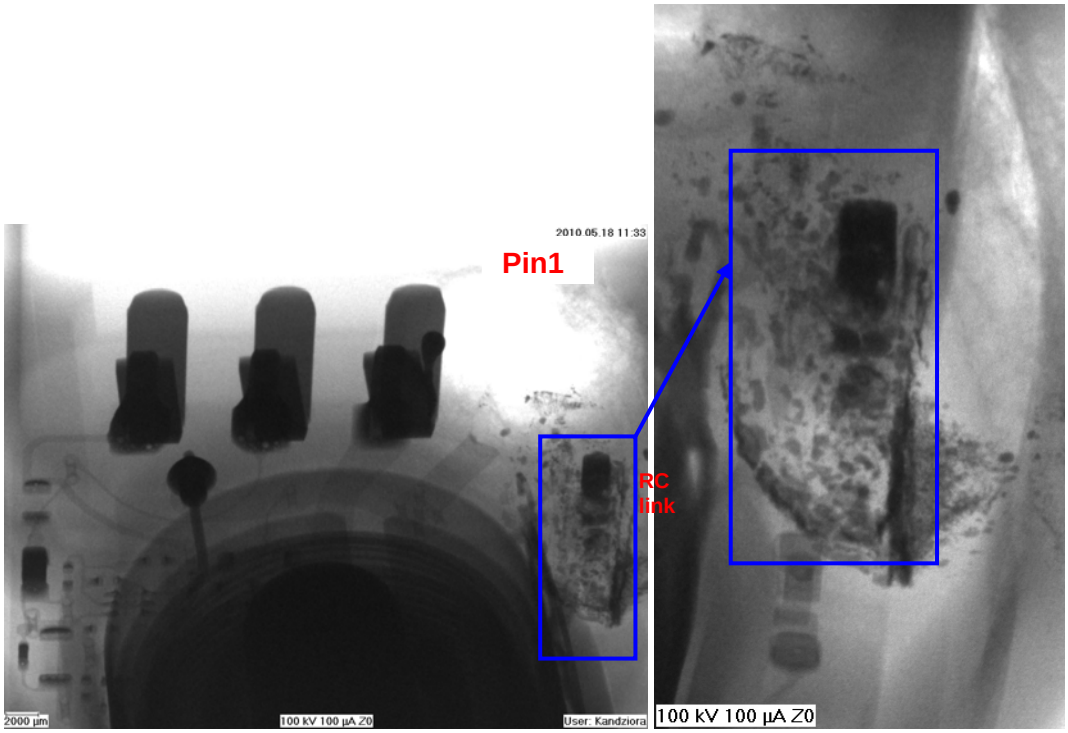


Image 18: printed circuit 11-z-10-02246_7

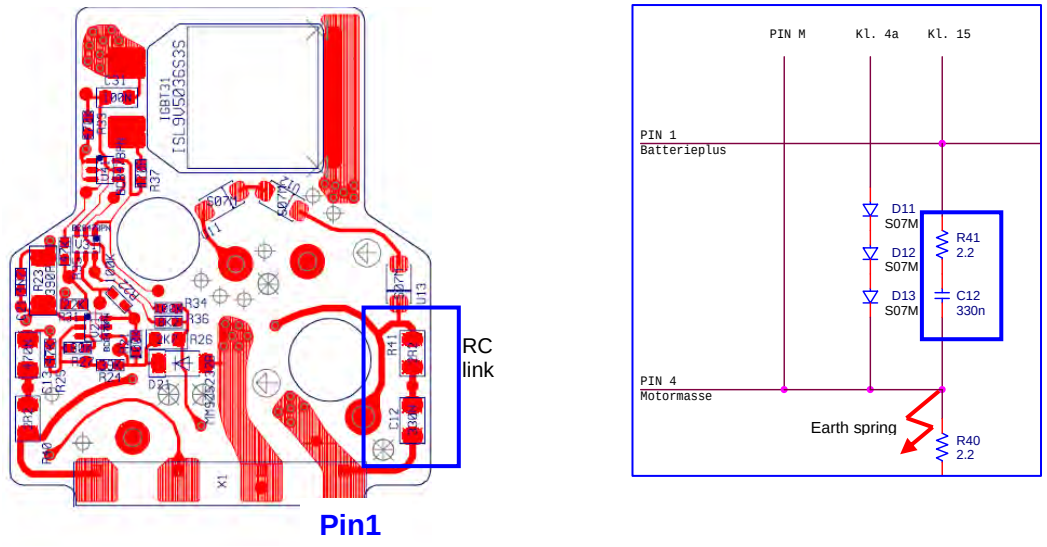


Image 19: printed circuits layout and excerpt from the current flow diagram

4 Processing

The results of these investigations were carried out with the help of IAV employees. The x-ray investigation was carried out on the Phoenix Nanomex 160NF. The individual results and machine parameters can be viewed in GQL-LM. The coils are available for further analyses at GQL-LM/5.

Audi
Quality assurance

Test Report FIELD

Complaint number	*Entry date*	*Factory*	*Complaint location*
0003391569	03.07.2009	21	USA

Damage part 07K 905 715 Ignition coil
Delivered part 07K 905 715 Ignition coil
Supplier 00075042 00 ELDOR CORPORATION S.P.A. ORSENIGO
VIA CAIO PLINIO 18 22030 ORSENIGO, ITALY

FSN *Dept.* *Telephone*

Parts manager
Damage assessor

SAGA code

Make	*Prod. daught.*	*ISO*	*DC*	*Partner*	*Task no.*	*Serial no. application date*
A	0200	USA	444	01A14	29025	01

VIN	*Replacement part*	*Damage type BD*
WAUDF78E06A083325	07K 905 715 D	0014 0

Vehicle type	*Km reading*	*Delivery date*	*Repair date*	*Control data*
8EC5CL	41.632	18.10.2005	21.05.2009	110

Service no. 2820 ignition coil *Type of damage* 0014

No. of complaint items	*No. of work items*	*Part manufacture date*	*Comment*
1,00	1,00	10.07.2005	09.08.2009

Complaint text

Complaint code *Complaint code text*

Fault code *Fault code text*
MM105 Component overloaded / corrosion visible on component

Originator *Comment* *From VIN*
Supplier

QTS status	*Delivery status*	*Completion indicator*	*In usage date*
3 10.07.2009	10.07.2009		

Test report no.	*Costs to be borne by*	*No. of cost items*
	Audi 21 6506	1,00

Cause/Action
4 parts received, 2x not okay

Audi
Quality assurance

Test Report FIELD

Complaint number	*Entry date*	*Factory*	*Complaint location*
0003410544	22.07.2009	26	USA

Damage part 07K 905 715 F Ignition coil

Delivered part 07K 905 715 F Ignition coil

Supplier 000152324 00 ELDOR ELEKTRONIK VE PLASTIK GAZIEMIR
AYHAN SOKAK N.16 35410 GAZIEMIR, TURKEY

FSN	*Dept.*	*Telephone*

Parts manager

Damage assessor

SAGA code

Make	*Prod. daught.*	*ISO*	*DC*	*Partner*	*Task no.*	*Serial no. application date*
A	0200	USA	444	06A21	43621	01

VIN	*Replacement part*	*Damage type BD*
WAUDF68EX5A472515	07K 905 715 F	0040 0

Vehicle type	*Km reading*	*Delivery date*	*Repair date*	*Control data*
8EC5E9	55.001	22.04.2005	13.04.2009	110

Service no. 2820 ignition coil ***Type of damage*** 0040

No. of complaint items	*No. of work items*	*Part manufacture date*	*Comment*
1,00	1,00		26.08.2009

Complaint text

Complaint code	*Complaint code text*

Fault code	*Fault code text*
MM105	Component overloaded / corrosion visible on component

Originator	*Comment*	*From VIN*
Supplier		

QTS status	*Delivery status*	*Completion indicator*	*In usage date*
3 27.07.2009	27.07.2009		

Test report no.	*Costs to be borne by*	*No. of cost items*
	Audi 21 6506	1,00

Cause/Action

4 parts received, 1x not okay

Audi
Quality assurance

Test Report FIELD

Complaint number	*Entry date*	*Factory*	*Complaint location*
0003553332	27.01.2010	21	USA

Damage part 07K 905 715 A Ignition coil
Delivered part 07K 905 715 A Ignition coil
Supplier 00075042 00 ELDOR CORPORATION S.P.A. ORSENIGO
VIA CAIO PLINIO 18 22030 ORSENIGO, ITALY

FSN *Dept.* *Telephone*

Parts manager
Damage assessor

SAGA code

Make	*Prod. daught.*	*ISO*	*DC*	*Partner*	*Task no.*	*Serial no. application date*
A	0200	USA	444	03A06	06588	01

VIN	*Replacement part*	*Damage type BD*
WAUDF78E86A183270	06H 905 115	0099 0

Vehicle type	*Km reading*	*Delivery date*	*Repair date*	*Control data*
8EC5EL	67.114	07.09.2006	03.11.2009	710

Service no. 28F0 I W-ignition coil (Pulse / E *Type of damage* 0099

No. of complaint items	*No. of work items*	*Part manufacture date*	*Comment*
1,00	1,00	12.10.2005	

Complaint text

Complaint code	*Complaint code text*
SA099	Campaign

Fault code	*Fault code text*
MM032	Function test okay / corrosion visible on component

Originator	*Comment*	*From VIN*
Supplier		

QTS status	*Delivery status*	*Completion indicator*	*In usage date*
2 29.01.2010	29.01.2010		

Test report no.	*Costs to be borne by*	*No. of cost items*
	Audi 21 6506	1,00

Cause/Action
2 parts received, 2x not okay

11-Z-10-03225

51 Stabzündspulen aus dem Markt USA

Auftragsbeschreibung

Analyse von 51 Teilen aus dem Markt USA.
Teile Nr. 07K.905.715 der Firma Eldor

Zusammenfassung

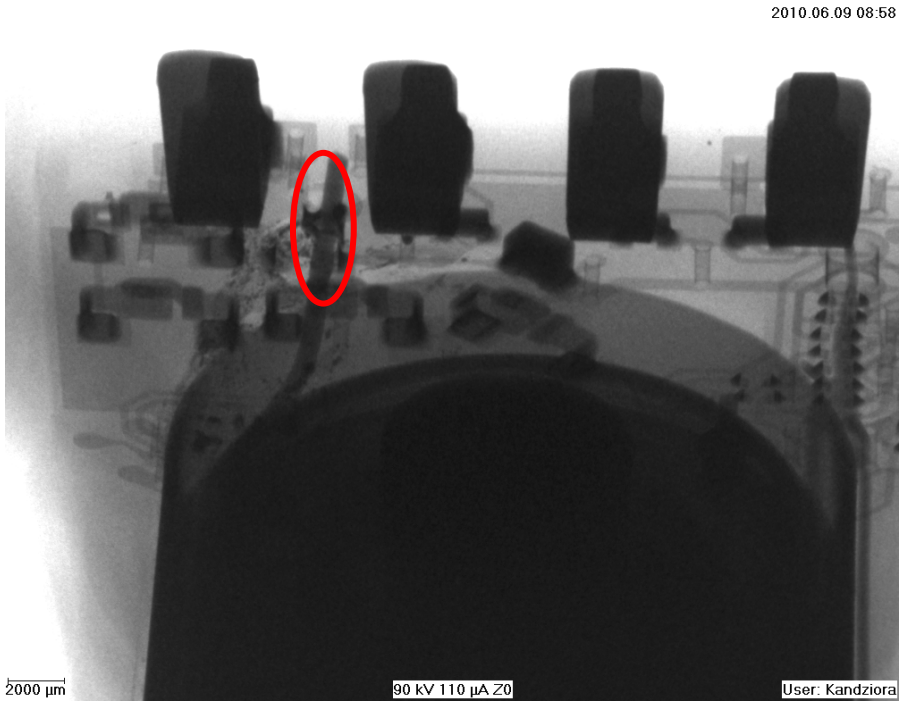
- Bei 6 Teile von 51 sind Fehler detektiert worden:
  - 2 SZS mit Durchschlag zum Kern
  - 3 SZS mit Auffälligkeiten im sekundären Spannungsverlauf
  - 1 SZS mit dauerhaftem Kurschluss 14V zur Masse
  - Eine der defekten Spulen stammt nicht aus dem Original-Zubehör von VW

Tabelle

SAB Nr	VW Nr	Fahrgestell Nr	Reparatur Datum	Produktions Datum	Fahrleistung in tkm	Lieferant	FDVW	HinweisQS HS-Gummi Durchmesser	elektr. Messung
11-2010.04.15-f-005	07K.905.715.C	3VWGN11K07M142083	17.03.2009	13.03.2007	43	Eldor	2006/50	8,7	DzK
11-2010.04.15-f-013	fake	3VWRM71K99M096786	15.09.2009	11.12.2008	7		-	fake	Usek
11-2010.04.15-f-019	07K.905.715.A	3VWHG11K39M023218	27.01.2009	06.08.2008	7	Eldor	2005/35	8,8	Kurzschluss->primär
11-2010.04.15-f-020	07K.905.715.D	3VWHG11K89M023974	06.07.2009	07.08.2008	18	Eldor	2008/25	8,8	SAE Stecker steckt drin, HS-Gummi Gerissen
11-2010.04.15-f-025	07K.905.715	3VWRG31Y99M401062	14.12.2009	20.07.2008	5	Eldor	2004/47	8,8	Usek
11-2010.04.15-f-041	07K.905.715.C	-	01.10.2009			Eldor	2006/50	8,8	DzK

Aus 51, zur Analyse stehenden, Teilen wurden 6 mit Fehlern detektiert

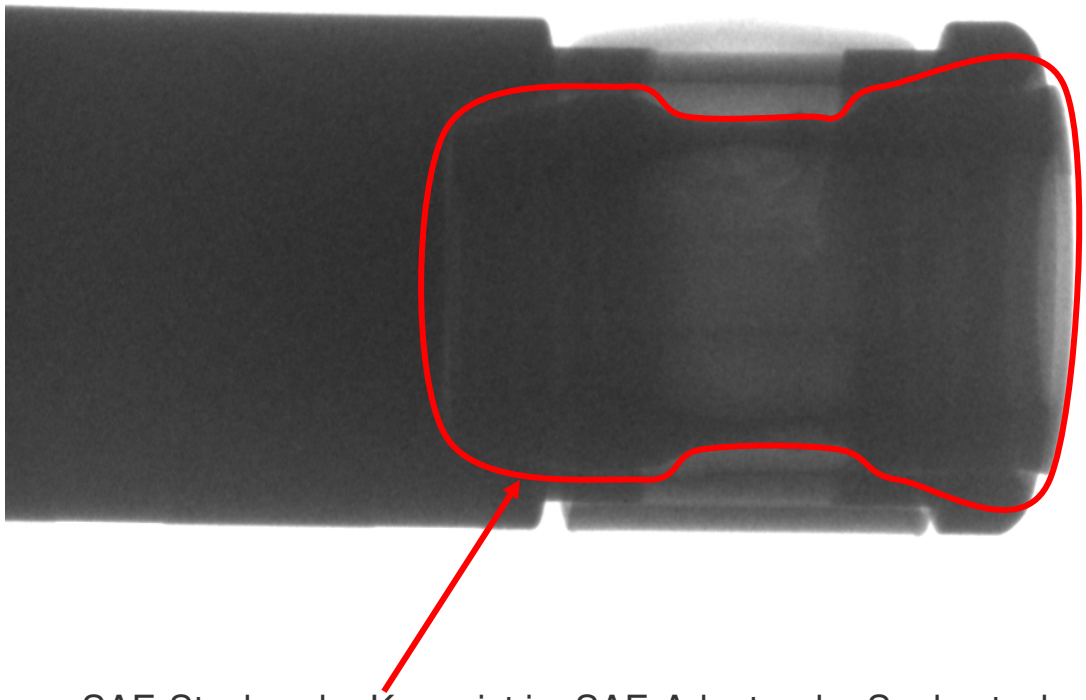
SAB 11-2010.04.15-019: Kurzschluß 14V<-> Masse



Lot von der Klemme 15 geschmolzen und leitende Verbindung zum Rückschlussblech aufgebaut, im Folge dessen entstand Kurzschluss (14V und Masse)

Labor GQL-L Qualitätssicherung

SAB 11-2010.04.15-020: Gummi gerissen, Usek auffällig



SAE-Stecker der Kerze ist im SAE-Adapter der Spule stecken geblieben

11-Z-10-03225

51 ignition coils from the USA market

Order description

Analysis of 51 parts from the USA market.
Part no. 07K.905.715 by Eldor

Summary

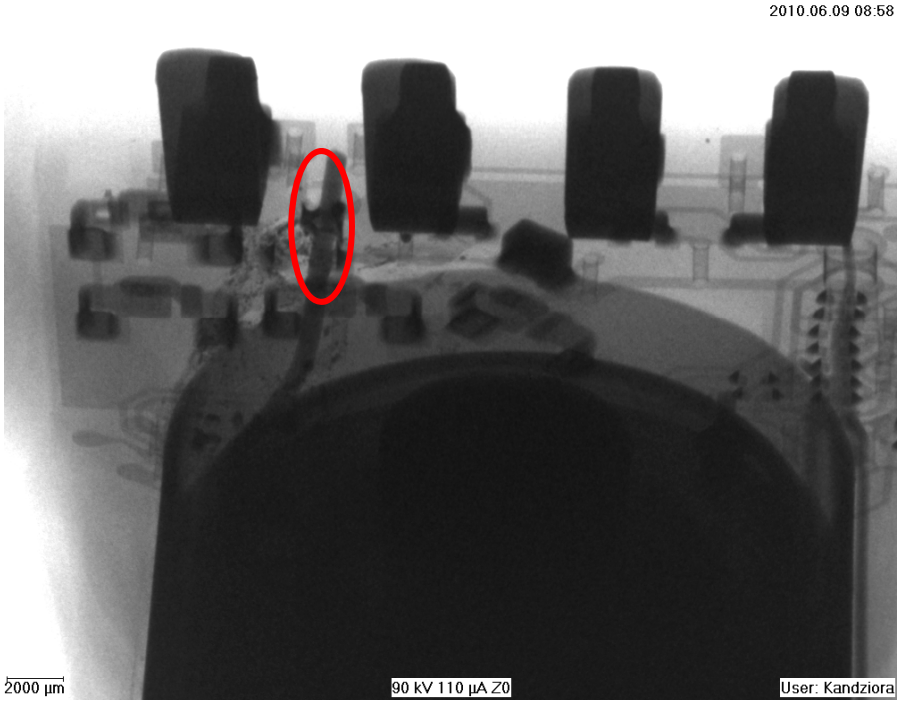
- Faults were detected in 6 parts of the 51:
  - 2 SZS with break through to the core
  - 3 SZS with irregularities in the secondary power supply
  - 1 SZS with permanent 14V to earth short circuit
  - One of the faulty coils was not an original VW part

Table

SAB Nr	VW Nr	Fahrgestell Nr	Reparatur Datum	Produktions Datum	Fahrleistung in tkm	Lieferant	FDVW	HinweisQS	HS-Gummi Durchmesser	elektr. Messung
11-2010.04.15-f-005	07K.905.715.C	3VWGN11K07M142083	17.03.2009	13.03.2007	43	Eldor	2006/50		8,7	DzK
11-2010.04.15-f-013	fake	3VWRM71K99M096786	15.09.2009	11.12.2008	7		-	fake		Usek
11-2010.04.15-f-019	07K.905.715.A	3VWHG11K39M023218	27.01.2009	06.08.2008	7	Eldor	2005/35		8,8	Kurzschluss->primär
11-2010.04.15-f-020	07K.905.715.D	3VWHG11K89M023974	06.07.2009	07.08.2008	18	Eldor	2008/25		8,8	SAE Stecker steckt drin, HS-Gummi Gerissen
11-2010.04.15-f-025	07K.905.715	3VWRG31Y99M401062	14.12.2009	20.07.2008	5	Eldor	2004/47		8,8	Usek
11-2010.04.15-f-041	07K.905.715.C	-	01.10.2009			Eldor	2006/50		8,8	DzK

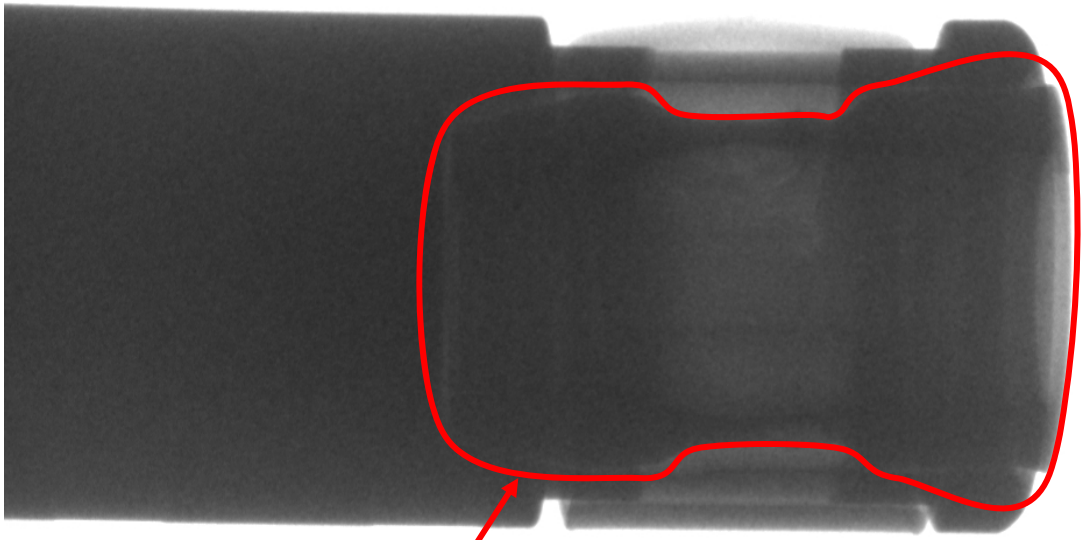
From 51 parts to be analysed, 6 were detected to have faults

SAB 11-2010.04.15-019: short circuit 14V<-> earth

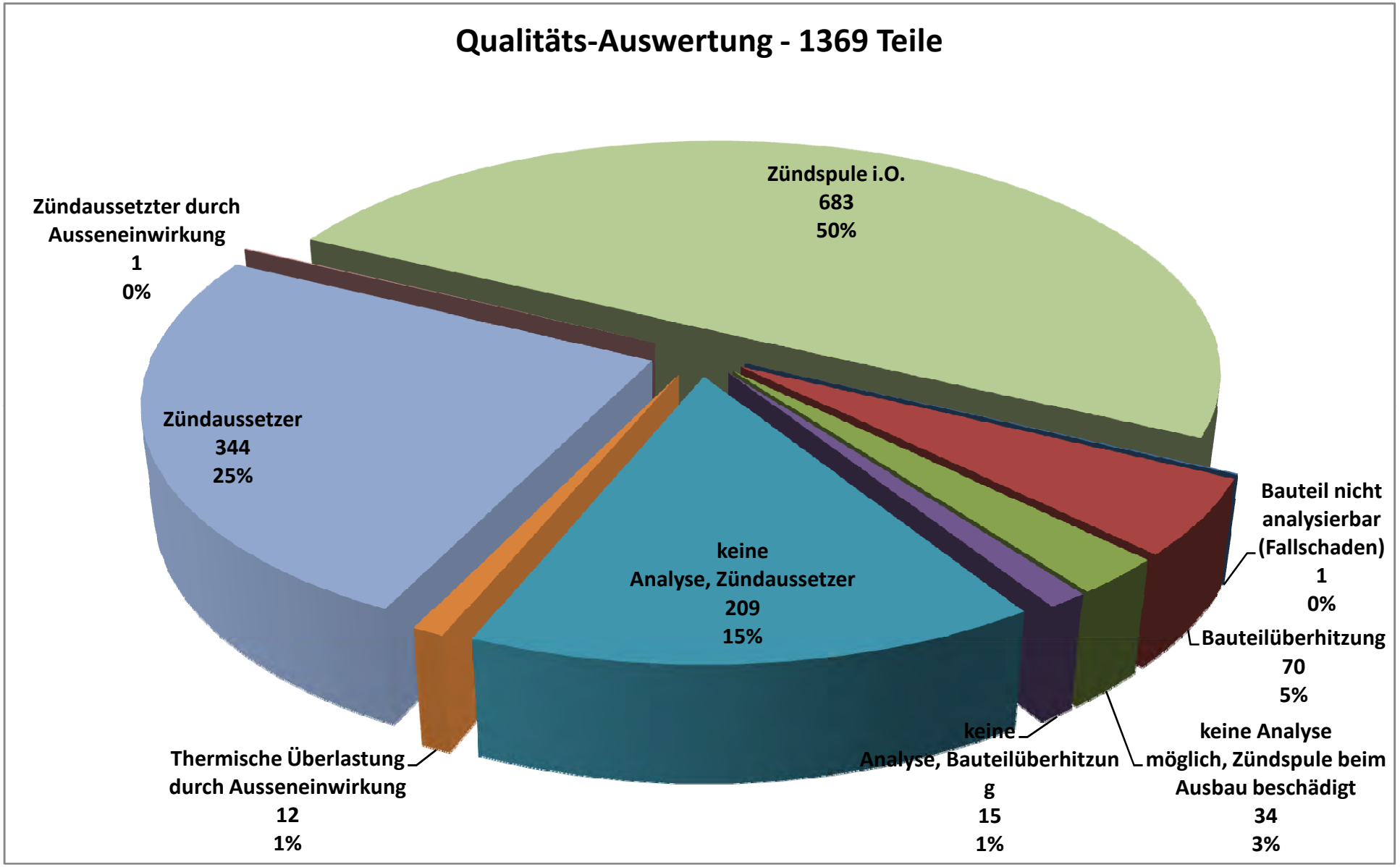


Solder from terminal 15 melted and leading connection to the return plate built up, the short circuit (14V and earth) occurred as a consequence of this

SAB 11-2010.04.15-020: rubber ripped, Usek noticeable



SAE connector on the plug got stuck in the SAE adapter of the coil


Qualitäts-Auswertung - 1369 Teile
Zündspule i.O.
683
50%
Zündaussetzter durch Ausseneinwirkung
1
0%
Zündaussetzer
344
25%
keine Analyse, Zündaussetzer
209
15%
Bauteil nicht analysierbar (Fallschaden)
1
0%
Bauteilüberhitzung
70
5%
Thermische Überlastung durch Ausseneinwirkung
12
1%
keine Analyse, Bauteilüberhitzung
15
1%
keine Analyse möglich, Zündspule beim Ausbau beschädigt
34
3%

Anzahl von SABNr	
Beanstandungsklasse	Ergebnis
Bauteil nicht analysierbar (Fallschaden)	1
Bauteilüberhitzung	70
keine Analyse möglich, Zündspule beim Ausbau beschädigt	34
keine Analyse, Bauteilüberhitzung	15
keine Analyse, Zündaussetzer	209
Thermische Überlastung durch Ausseneinwirkung	12
Zündaussetzer	344
Zündaussetzter durch Ausseneinwirkung	1
Zündspule i.O.	683
Gesamtergebnis	1369

MJ2002 -2010, VZ: USA

SABNr	VW-Fehlertext	Fehlerc	Beanstandungsklasse	VWNrPrg	VWNrRumpf	VWNrIndex	VertriebsZentrum	WerkstattNr	Antragsnr	Auftragsnr	Fahrgestellnr	MY	Motor	MotorKB	FzgModell	FzgName	ReparaturDatum	WdhReparatur	ProduktionsDatum	LiegenbleiberFahrleistungIn1000km	SchadenshinweisWerkstatt	SGNr	SWStand	SWCode	Freq1	PCode1	PCindex1	Freq2	PCode2	PCindex2	Freq3	PCode3	PCindex3	KDNr	LieNr	LiefTD	FDVW	HinweisQS	LiefTeilNr
12-2003.06.4-0-010	geraet nicht auffindbar	9999	keine Analyse, Zundaussetzer	022	905100	405	024	76971	XXXXXX7DX3H01385		2003 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	28.05.2003	FALSCH	18.03.2003	FALSCH	3 replacie coil per VWOA, coils faulty													2820	00154Z0	I 2 19/02	2002/19	Gummi nach unten verschoben	1197 1esm
11-2003.12.18-4-016	KFF (Analyse VW)	0001	Zündspule i.O.	06B	905115	J	444	08203	06122-ac		XXXXXX3BX3P27994	2003	1,8 ltr. 125kW	T ULEV	3B3K5	VW 451 PASSAT	15.10.2003	FALSCH	18.08.2003	FALSCH	6 Mil Lite on					P0300	008		P0304	008				2820	00154Z0	II 1 4 45/02	2002/45	Fehler	1196 7esm
11-2003.12.18-4-017	KFF (Analyse VW)	0001	Zündspule i.O.	06B	905115	J	444	20155	01238-ac		XXXXXX3BX3P26528	2003	1,8 ltr. 125kW	T ULEV	3B34K5	VW 451 PASSAT	29.09.2003	FALSCH	19.07.2003	FALSCH	5 Mil Lite on, found #4 Coil misfiring													2820	00154Z0	II 1 3 42/02	2002/42	Fehler	1196 7esm
12-2003.06.27-5-007	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	405	024	76971	XXXXXX7DX3H01385		2003 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	28.05.2003	FALSCH	18.03.2003	FALSCH	3 replacie coil per VWOA, coils faulty													2820	00154Z0	I 2 19/02	2002/19	Gummi nach unten verschoben	1197 1esm
12-2003.06.27-5-008	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	405	024	76971	XXXXXX7DX3H01385		2003 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	28.05.2003	FALSCH	18.03.2003	FALSCH	3 replacie coil per VWOA, coils faulty													2820	00154Z0	I 2 19/02	2002/19	verschoben	1197 1esm
12-2003.06.27-5-009	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	405	024	76971	XXXXXX7DX3H01385		2003 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	28.05.2003	FALSCH	18.03.2003	FALSCH	3 replacie coil per VWOA, coils faulty													2820	00154Z0	I 2 19/02	2002/19	verschoben	1197 1esm
12-2003.08.18-6-076	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	420	130	86648	XXXXXX7DX2H10942		2002 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	07.05.2003	FALSCH	09.10.2002	FALSCH	15 check eng light flashing					P0306	035		P0302	035		P0301	035	2820	00154Z0	L2 III 6 03/03	2003/03	RT I.O.	1197 1esm
12-2003.08.18-6-074	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	420	130	86648	XXXXXX7DX2H10942		2002 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	07.05.2003	FALSCH	09.10.2002	FALSCH	15 check eng light flashing					P0306	035		P0302	035		P0301	035	2820	00154Z0	L2 III 6 03/03	2003/03	RT I.O.	1197 1esm
12-2003.08.18-6-075	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	420	130	86648	XXXXXX7DX2H10942		2002 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	07.05.2003	FALSCH	09.10.2002	FALSCH	15 check eng light flashing					P0306	035		P0302	035		P0301	035	2820	00154Z0	L2 III 6 03/03	2003/03	RT I.O.	1197 1esm
12-2003.06.17-4-004	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	426	078	99663	XXXXXX7DX2H04212		2002 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	24.04.2003	FALSCH	15.11.2001	FALSCH	34 potential coil problems													2820	00154Z0	II 4 29/01	2001/29		1197 1esm
12-2003.06.17-4-005	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	426	078	99663	XXXXXX7DX2H04212		2002 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	24.04.2003	FALSCH	15.11.2001	FALSCH	34 potential coil problems													2820	00154Z0	II 4 29/01	2001/29		1197 1esm
12-2003.06.17-4-006	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	426	078	99663	XXXXXX7DX2H04212		2002 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	24.04.2003	FALSCH	15.11.2001	FALSCH	34 potential coil problems													2820	00154Z0	II 4 29/01	2001/29		1197 1esm
12-2003.06.17-4-007	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	426	078	99663	XXXXXX7DX2H04212		2002 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	24.04.2003	FALSCH	15.11.2001	FALSCH	34 potential coil problems													2820	00154Z0	II 4 29/01	2001/29		1197 1esm
12-2003.06.13-4-001	KFF (Analyse VW)	0001	Zündspule i.O.	07C	905115	C	405	051	97109	XXXXXX3BX3P27412		2003 4,0 ltr. 202kW	k.l.	3B38V9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH	0													2870	00154Z0	L1 III 6 42/02	2002/42		1196 4sm
12-2003.06.13-4-002	KFF (Analyse VW)	0001	Zündspule i.O.	07C	905115	C	405	051	97109	XXXXXX3BX3P27412		2003 4,0 ltr. 202kW	k.l.	3B38V9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH	0													2870	00154Z0	L1 III 6 42/02	2002/42		1196 4sm
12-2003.06.17-4-004	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	405	024	76971	XXXXXX7DX3H01385		2003 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	28.05.2003	FALSCH	18.03.2003	FALSCH	3 replacie coil per VWOA, coils faulty													2820	00154Z0	I 2 19/02	2002/19	Gummi nach unten verschoben	1197 1esm
12-2003.06.27-5-005	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	405	024	76971	XXXXXX7DX3H01385		2003 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	28.05.2003	FALSCH	18.03.2003	FALSCH	3 replacie coil per VWOA, coils faulty													2820	00154Z0	I 2 19/02	2002/19	Gummi nach unten verschoben	1197 1esm
12-2003.06.27-5-006	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	409	449	26873	XXXXXX7DX2H05979		2002 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	19.05.2003	FALSCH	29.06.2002	FALSCH	35 start ups				s	P0304	035	s	P0303	035	s	P0301	035	2820	00154Z0	II 6 35/01	2001/35	verschoben	1197 1esm
12-2003.06.03-1-001	KFF (Analyse VW)	0001	Zündspule i.O.	06B	905115	J	408	b12	37679	XXXXXX8EX3A26218		2003 1,8 ltr. 125kW	k.l.	8E5525	AU 452 AUDI A4 AVANT	08.05.2003	FALSCH	12.04.2003	FALSCH	3 eng lite comes on after car gets wet					P1355	004							2820	00154Z0	L1 III 7 48/02	2002/48		1196 7esm
12-2003.06.16-4-009	KFF (Analyse VW)	0001	Zündspule i.O.	06B	905115	J	408	269	60554	XXXXXX1JX3W37656		2003 1,8 ltr. 132kW	k.l.	1J65P8	VW 342 BORA VARIANT	23.05.2003	FALSCH	15.04.2003	FALSCH	2 starts very rough					P0304	035		P0302	035		P0301	035	2820	00154Z0	L1 III 5 42/02	2002/42		1196 7esm
12-2003.06.16-5-010	KFF (Analyse VW)	0001	Zündspule i.O.	06B	905115	J	408	269	60554	XXXXXX1JX3W37656		2003 1,8 ltr. 132kW	k.l.	1J65P8	VW 342 BORA VARIANT	23.05.2003	FALSCH	15.04.2003	FALSCH	2 starts very rough					P0304	035		P0302	035		P0301	035	2820	00154Z0	L1 III 5 42/02	2002/42		1196 7esm
12-2003.06.16-5-011	KFF (Analyse VW)	0001	Zündspule i.O.	06B	905115	J	408	269	60554	XXXXXX1JX3W37656		2003 1,8 ltr. 132kW	k.l.	1J65P8	VW 342 BORA VARIANT	23.05.2003	FALSCH	15.04.2003	FALSCH	2 starts very rough					P0304	035		P0302	035		P0301	035	2820	00154Z0	L1 III 5 42/02	2002/42		1196 7esm
12-2003.06.17-7-001	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	408	258	09837	XXXXXX7DX2H08511		2002 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	24.04.2003	FALSCH	27.06.2002	FALSCH	23 mileage light is illuminated					P0306	035		P0300	035				2820	00154Z0	III 3 44/01	2001/44		1197 1esm
12-2003.06.17-4-002	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	426	078	99663	XXXXXX7DX2H04212		2002 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	24.04.2003	FALSCH	15.11.2001	FALSCH	34 potential coil problems													2820	00154Z0	II 4 29/01	2001/29		1197 1esm
12-2003.06.17-4-003	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	426	078	99663	XXXXXX7DX2H04212		2002 2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	24.04.2003	FALSCH	15.11.2001	FALSCH	34 potential coil problems													2820	00154Z0	II 4 29/01	2001/29		1197 1esm
12-2003.06.13-4-0031	KFF (Analyse VW)	0001	Zündspule i.O.	07C	905115	C	405	051	97109	XXXXXX3BX3P27412		2003 4,0 ltr. 202kW	k.l.	3B38V9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH	0													2870	00154Z0	L1 III 6 42/02	2002/42		1196 4sm
12-2003.06.13-4-0041	KFF (Analyse VW)	0001	Zündspule i.O.	07C	905115	C	405	051	97109	XXXXXX3BX3P27412		2003 4,0 ltr. 202kW	k.l.	3B38V9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH	0													2870	00154Z0	L1 III 6 42/02	2002/42		1196 4sm
12-2003.06.13-4-0051	KFF (Analyse VW)	0001	Zündspule i.O.	07C	905115	C	405	051	97109	XXXXXX3BX3P27412		2003 4,0 ltr. 202kW	k.l.	3B38V9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH	0													2870	00154Z0	L1 III 6 42/02	2002/42		1196 4sm
12-2003.06.13-4-006	KFF (Analyse VW)	0001	Zündspule i.O.	07C	905115	C	405	051	97109	XXXXXX3BX3P27412		2003 4,0 ltr. 202kW	k.l.	3B38V9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH	0													2870	00154Z0	L1 III 6 42/02	2002/42		1196 4sm
12-2003.06.13-4-007	KFF (Analyse VW)	0001	Zündspule i.O.	07C	905115	C	405	051	97109	XXXXXX3BX3P27412		2003 4,0 ltr. 202kW	k.l.	3B38V9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH	0													2870	00154Z0	L1 III 6 42/02	2002/42		1196 4sm
12-2003.06.13-4-0081	KFF (Analyse VW)	0001	Zündspule i.O.	07C	905115	C	405	051	97109	XXXXXX3BX3P27412		2003 4,0 ltr. 202kW	k.l.	3B38V9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH	0													2870	00154Z0	L1 III 6 42/02	2002/42		1196 4sm
12-2003.08.18-6-0011	KFF (Analyse VW)	0002	Zündspule i.O.	022	905100	F	424	330	78085	XXXXXX7DX2H02754		2002 2,8 ltr. 150kW	4V	7DC2A3	VN 7400 CARAVELLE KURZ	07.07.2003	FALSCH	12.02.2002	FALSCH	13 check engine light on, engine has a miss test													2820	00154Z0	L2,2491 4 20/03	2003/20	RT I.O.	1249 0esm
12-2003.05.26-4-008	KFF (Analyse VW)	0001	Zündspule i.O.	06B	905115	J	409	246	40050	XXXXXX8EX3E32165		2003 1,8 ltr. 125kW	T ULEV	3B64K5	VW 452 PASSAT VARIANT	01.05.2003	FALSCH	19.04.2003	FALSCH	1 check eng light on													2820	00154Z0	L1 III 6 41/02	2002/41		1196 7esm
12-2003.06.03-6-002	KFF (Analyse VW)	0001	Zündspule i.O.	06B	905115	J	408	b12	37679	XXXXXX8EX3A26218		2003 1,8 ltr. 125kW	k.l.	8E5525	AU 452 AUDI A4 AVANT	08.05.2003	FALSCH	12.04.2003	FALSCH	3 eng lite comes on after car gets wet					P1355	004							2820	00154Z0	L1 III 7 48/02	2002/48		1196 7esm
12-2003.06.03-5-003	KFF (Analyse VW)	0001	Zündspule i.O.	06B	905115	J	408	b12	37679	XXXXXX8EX3A26218		2003 1,8 ltr. 125kW	k.l.	8E5525	AU 452 AUDI A4 AVANT	08.05.2003	FALSCH	12.04.2003	FALSCH	3 eng lite comes on after car gets wet					P1355	004							2820	00154Z0	L1 III 7 48/02	2002/48		1196 7esm
12-2003.06.03-4-004	KFF (Analyse VW)	0001	Zündspule i.O.	06B	905115	J	408	b12	37679	XXXXXX8EX3A26218		2003 1,8 ltr. 125kW	k.l.	8E5525	AU 452 AUDI A4 AVANT	08.05.2003	FALSCH	12.04.2003	FALSCH	3 eng lite comes on after car gets wet					P1355	004							2820	00154Z0	L1 III 7 48/02	2002/48		1196 7esm
11-2005.04.28-4-011	KFF (Analyse VW)	0001	Zündspule i.O.	06B	905115	L	425	157	47835	47835	3VWCD31Y54M333947	2004	1,8 ltr.	k.l.	1Y75N4	VW NEW BEETLE	23.12.2004	28.05.2004	FALSCH	16 misfire all 4 cylinders					P0300	035		P0301	035		P0303	035	2820	00154Z0	L1 1cc3 1 43/03	2003/43	optisch i.O., Anzahl SF pro Antrag: 3	
11-2005.01.18-6-012	KFF (Analyse VW)	0002	Zündspule i.O.	022	905100	H	409	412	265246	65246AC	ZG7TL05D019168	2005	3,2 ltr. 162kW	k.l.	a.l.	VW 756 TOUAREG	24.01.2004	FALSCH		FALSCH	1 Misfire					P0305	001		P0301	001				2820	00154Z0	L2 D39F 6 36/03	2003/36	Keine elektr.Besonderheiten, optisch i.O.	1249 2esm
11-2005.01.18-6-013	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	H	409	412	265246	65246AC	ZG7TL05D019168	2005	3,2 ltr. 162kW	k.l.	a.l.	VW 756 TOUAREG	24.01.2004	FALSCH		FALSCH	1 Misfire					P0305	001		P0301	001				2820	00154Z0	L2 D3AD 6 36/03	2003/36	Keine elektr.Besonderheiten, optisch i.O.	1249 2esm
11-2005.01.18-6-014	KFF (Analyse VW)	0002	Zündspule i.O.	022	905100	H	409	412	265246	65246AC	ZG7TL05D019168	2005	3,2 ltr. 162kW	k.l.	a.l.	VW 756 TOUAREG	24.01.2004	FALSCH		FALSCH	1 Misfire					P0305	001		P0301	001				2820	00154Z0	L2 D3C3 6 36/03	2003/36	Keine elektr.Besonderheiten, optisch i.O.	1249 2esm
11-2005.04.28-4-010	KFF (Analyse VW)	0001	Zündspule i.O.	06B	905115	L	425	157	47835	47835	3VWCD31Y54M333947	2004	1,8 ltr.	k.l.	1Y75N4	VW NEW BEETLE	23.12.2004	28.05.2004	FALSCH	16 misfire all 4 cylinders					P0300	035		P0303	035				2820	00154Z0	L1 1cc3 1 43/03	2003/43	optisch i.O., Anzahl SF pro Antrag: 3	
11-2005.01.18-6-002	KFF (Analyse VW)	0002	Zündspule i.O.	022	905100	L	405	074		78651	BC7TL84D080974	2004	3,2 ltr. 162kW	k.l.	7LABC1	VW 756 TOUAREG	30.11.2004	FALSCH	15.07.2004	FALSCH	6													2820	00154Z0	L2 MD91 4 14/04	2004/14	Keine elektr.Besonderheiten	
11-2005.01.18-6-004	KFF (Analyse VW)	0002	Zündspule i.O.	022	905100	H	423	063	/047598	85454	BC7TL94D061608	2004	3,2 ltr. 162kW	a.l.	a.l.	VW 756 TOUAREG	22.12.2004	FALSCH		FALSCH	1					P0303			P0303					2820	00154Z0	L2 J3DD 5 50/03	2003/50	Keine elektr.Besonderheiten, optisch i.O.	12492esm
11-2005.01.18-6-005	KFF (Analyse VW)	0002	Zündspule i.O.	022	905100	H	423	063	/047598	85454	BC7TL94D061608	2004	3,2 ltr. 162kW	a.l.	a.l.	VW 756 TOUAREG	22.12.2004	FALSCH		FALSCH	1					P0300			P0303					2820	00154Z0	L2 .JA4 7 50/03	2003/50	Keine elektr.Besonderheiten, optisch i.O.	12492esm
11-2005.04.28-4-009	KFF (Analyse VW)	0001	Zündspule i.O.	06B	905115	L	425	157	47835	47835	3VWCD31Y54M333947	2004	1,8 ltr.	k.l.	1Y75N4	VW NEW BEETLE	23.12.2004	28.05.2004	FALSCH	16 misfire all 4 cylinders					P0300	035		P0301	035		P0303	035	2820	00154Z0	L1 1a85 1 43/03	2003/43	optisch i.O., Anzahl SF pro Antrag: 3	
11-2005.01.18-6-006	KFF (Analyse VW)	0002	Zündspule i.O.	022	905100	H	423	063	/047598	85454	BC7TL94D061608	2004	3,2 ltr. 162kW	a.l.	a.l.	VW 756 TOUAREG	22.12.2004	FALSCH		FALSCH	1					P0300			P0303					2820	00154Z0	L2 J48B 5 50/03	2003/50	Keine elektr.Besonderheiten, optisch i.O.	12492esm
11-2005.01.18-6-007	KFF (Analyse VW)	0002	Zündspule i.O.	022	905100	H	423	063	/047598	85454	BC7TL94D061608	2004	3,2 ltr. 162kW	a.l.	a.l.	VW 756 TOUAREG	22.12.2004	FALSCH		FALSCH	1					P0300			P0303					2820	00154Z0	L2 J49F 5 50/03	2003/50	Keine elektr.Besonderheiten, optisch i.O.	12492esm
11-2005.01.18-6-008	KFF (Analyse VW)	0002	Zündspule i.O.	022	905100	H	423	063	/047598	85454	BC7TL94D061608	2004	3,2 ltr. 162kW	a.l.	a.l.	VW 756 TOUAREG	22.12.2004	FALSCH		FALSCH	1					P0300			P0303					2820	00154Z0	L2 J3F0 5 50/03	2003/50	Keine elektr.Besonderheiten, optisch i.O.	12492esm
11-2005.01.18-6-010	KFF (Analyse VW)	0002	Zündspule i.O.	022	905100	H	409	412	265246	65246AC	ZG7TL05D019168	2005	3,2 ltr. 162kW	k.l.	a.l.	VW 756 TOUAREG	24.01.2004	FALSCH		FALSCH	1 Misfire					P0305	001		P0301	001				2820	00154Z0	L2 D3C8 6 36/03	2003/36	Keine elektr.Besonderheiten, optisch i.O.	1249 2esm
11-2005.01.18-6-011	KFF (Analyse VW)	0002	Zündspule i.O.	022	905100	H	409	412	265246	65246AC	ZG7TL05D019168	2005	3,2 ltr. 162kW	k.l.	a.l.	VW 756 TOUAREG	24.01.2004	FALSCH		FALSCH	1 Misfire					P0305	001		P0301	001				2820	00154Z0	L2 D3CB 6 36/03	2003/36	Keine elektr.Besonderheiten, optisch i.O.	1249 2esm
11-2006.11.09-1-002	KFF (Analyse VW)	0001	Zündspule i.O.	06B	905115	N	402	125	69944		WWAD63B15P051577	2005	5V Turbo	k.l.			17.10.2006	FALSCH	20.12.2004	FALSCH	60 Mil. on					P0304	001							0014	52A0	L1 Ll7a 5 37/04	2004/37	Feuchtigkeitsspuren, Anzahl SF pro Antrag: 1	12472esm
11-2007.06.14-6-046	KFF (Analyse VW)	0002	Zündspule i.O.	022	905100	T	408	376	77853ac		WVGZE77L37D000090	2006	3,6 ltr. 206kW	BHK	7LABE1	VW TOUAREG	30.01.2007	FALSCH	09.03.2006	FALSCH	10 Check engine light is on					P0300	001		P0303	001		P0306	001	2820	00154Z0	L2 6483 5 03/06	2006/03	Antrag: 1	12448esm
11-2007.06.14-6-047	KFF (Analyse VW)	0001	Zündspule i.O.	07K	905715	B	402	141	21814ac		3VWRW31K2CM501184	2006	2,5 ltr. 110kW	BPS	1C1S8A	VW JETTA	13.02.2007	FALSCH	11.04.2006	FALSCH	11 Check engine light is on					P0300	001		P0304	001				2820	07504Z0	03/5 I 4 07/06	2006/07	Stecker,bei RT i.O, Anzahl SF pro Antrag: 1	72323012
11-2007.06.14-6-024	KFF (Analyse VW)	0001	Zündspule i.O.	07K	905715	B	422	600	93540BC		3VWXJ71K07M042967	2007	2,0 ltr. 147kW	BPY	1K2BV2	VW JETTA	27.09.2006	FALSCH	04.08.2006	FALSCH	4 Batt. Lamp is on during cold Start up													2820	07504Z0	03/5 III 1 23/06	2006/23	Antrag: 4	78230012
11-2007.06.14-6-027	KFF (Analyse VW)	0001	Zündspule i.O.	07K	905715	B	422	600	93540BC		3VWXJ71K07M042967	2007	2,0 ltr. 147kW	BPY	1K2BV2	VW JETTA	27.09.2006	FALSCH	04.08.2006	FALSCH	4 Batt. Lamp is on during cold Start up													2820	07504Z0	03/5 III 1 23/06	2006/23	Antrag: 4	78230012
11-2007.06.14-6-029	KFF (Analyse VW)	0001	Zündspule i.O.	07K	905715	B	422	600	93540BC		3VWXJ71K07M042967	2007	2,0 ltr. 147kW	BPY	1K2BV2	VW JETTA	27.09.2006	FALSCH	04.08.2006	FALSCH	4 Batt. Lamp is on during cold Start up													2820	07504Z0	03/5 III 1 23/06	2006/23	Antrag: 4	78230012
11-2007.06.14-6-011	KFF (Analyse VW)	0001	Zündspule i.O.	07K	905715	B	405	074	38174bc		3VWXJ71K67M036834	2007	2,0 ltr. 147kW	BPY	1K2BV2	VW JETTA	21.02.2007	FALSCH	06.09.2006	FALSCH	4 Batt. Lamp is on during cold Start up													2820	07504Z0	13/2 III 3 07/06	2006/07	Antrag: 4	
11-2007.06.14-6-011	KFF (Analyse VW)	0001	Zündspule i.O.	07K	905715	B	405	074	38174bc		3VWXJ71K67M036834	2007	2,0 ltr. 147kW	BPY	1K2BV2	VW JETTA	21.02.2007	FALSCH	06.09.2006	FALSCH	4 Batt. Lamp is on during cold Start up													2820	07504Z0	13/3 III 3 07/06	2006/07	Stecker,bei RT i.O, Anzahl SF pro Antrag: 4	78230012
11-2007.06.14-6-013	KFF (Analyse VW)	0001	Zündspule i.O.	07K	905715	B	405	074	38174bc		3VWXJ71K67M036834	2007	2,0 ltr. 147kW	BPY	1K2BV2	VW JETTA	21.02.2007	FALSCH	06.09.2006	FALSCH	4 Batt. Lamp is on during cold Start up													2820	07504Z0	13/3 III 3 07/06	2006/07	Stecker,bei RT i.O, Anzahl SF pro Antrag: 4	78230012
11-2007.06.14-6-013	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	S	444	01124		84496	WVWDB71F47V023379	2007	3,2 ltr. 184kW	BUB	a.l.	VW EOS CABRIO	12.12.2006	FALSCH	09.11.2006	FALSCH	0					P0300	001		P0301	001				2820	00154Z0	L2 H860 3 41/06	2006/41	+Zündkerze,bei RT i.O, Anzahl SF pro Antrag: 3	12456esm
11-2007.06.14-6-014	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	S	444	01124		84496	WVWDB71F47V023379	2007	3,2 ltr. 184kW	BUB	a.l.	VW EOS CABRIO	12.12.2006	FALSCH	09.11.2006	FALSCH	0					P0300	001		P0301	001	P0303	001	2820	00154Z0	L2 H888 3 41/06	2006/41	+Zündkerze,bei RT i.O, Anzahl SF pro Antrag: 3	12456esm
11-2007.06.14-6-015	KFF (Analyse VW)	0001	Zündspule i.O.	022	905100	S	444	01124		84496	WVWDB71F47V023379	2007	3,2 ltr. 184kW	BUB	a.l.	VW EOS CABRIO	12.12.2006	FALSCH	09.11.2006	FALSCH	0					P0300	001		P0301	001	P0303	001	2820	00154Z0	L2 H8bf 3 41/06	2006/41	+Zündkerze,bei RT i.O, Anzahl SF pro Antrag: 3	12456esm
11-2007.06.14-6-016	KFF (Analyse VW)	0001	Zündspule i.O.	07K	905715	B	406	530	51113ac		3VWWJ81K37M042950	2007	2,0 ltr. 147kW	BPY	1K2BV2	VW JETTA	14.09.2006	FALSCH	04.08.2006	FALSCH	2 Batt. Lamp is on during cold Start up													2820	07504Z0	03/5 III 1 23/06	2006/23	Antrag: 4	78230012
11-2007.06.14-6-017	KFF (Analyse VW)	0001	Zündspule i.O.	07K	905715	B	406	530	51113ac		3VWWJ81K37M042950	2007	2,0 ltr. 147kW	BPY	1K2BV2	VW JETTA	02.02.2007	FALSCH	14.09.2006	FALSCH	2 Batt. Lamp is on during cold Start up													2820	07504Z0	03/5 III 1 23/06	2006/23	Antrag: 4	78230012
12-2003.01.16-5-028	KFF (Analyse VW)	0002	Zündspule i.O.	06B	905115	J	405	073	85384	XXXXXX3BX3E13824		2003 1,8 ltr. 125kW	T ULEV	3B64K5	VW 452 PASSAT VARIANT	08.11.2002	FALSCH		FALSCH	1 engine runs rough sputtering					P0302	035		P0300	035				2820	00154Z0	L1 III 6 32/02	2002/32	goldfarbige Nr. 28 (auf Spulenkopf)	1196 7esm
12-2002.11.12-6-006	KFF (Analyse Lieferant)	0002	Zündspule i.O.	06B	905115	J	425	154	72741	XXXXXX9MX2M11054		2002 1,8 ltr. 110kW	T LEV	9M25N8	VW 340 JETTA	10.10.2002	FALSCH	04.10.2002	FALSCH	2 engine light is on/ all 4 coils have high resistance													2820	00154Z0	L1 I 7 6 41/02	2002/41		1196 7esm
12-2002.11.12-6-007	KFF

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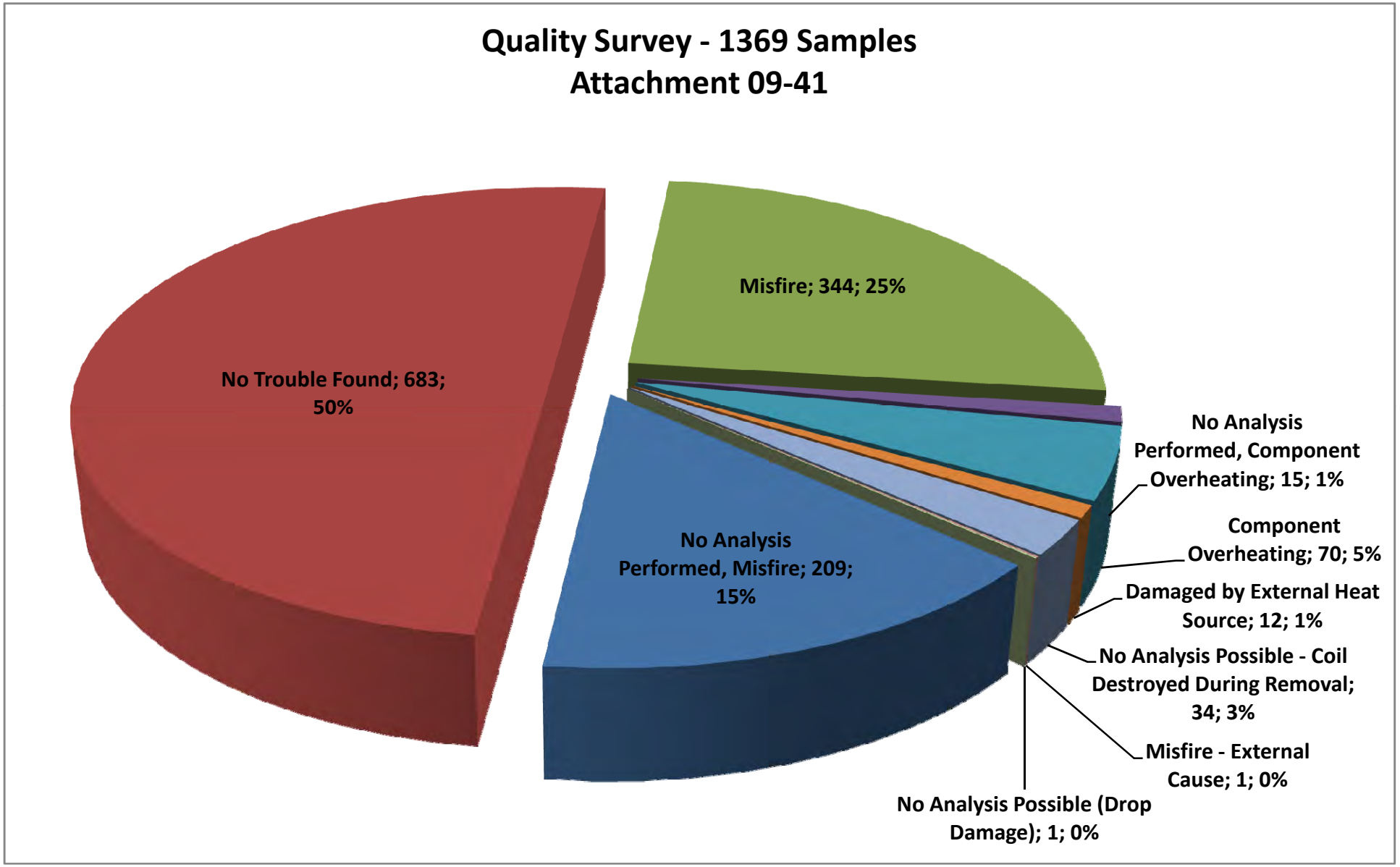
Quality Survey - 1369 Samples
Attachment 09-41
No Trouble Found; 683; 50%
Misfire; 344; 25%
No Analysis Performed, Misfire; 209; 15%
No Analysis Performed, Component Overheating; 15; 1%
Component Overheating; 70; 5%
Damaged by External Heat Source; 12; 1%
No Analysis Possible - Coil Destroyed During Removal; 34; 3%
Misfire - External Cause; 1; 0%
No Analysis Possible (Drop Damage); 1; 0%

Anzahl von Sample Nr	
Fault Category	Ergebnis
No Analysis Performed, Misfire	209
No Trouble Found	683
Misfire	344
No Analysis Performed, Component Overheating	15
Component Overheating	70
Damaged by External Heat Source	12
No Analysis Possible - Coil Destroyed During Removal	34
Misfire - External Cause	1
No Analysis Possible (Drop Damage)	1
Gesamtergebnis	1369

MY2002 -2010, Market: USA

Sample Nr	VW Fault text	Fault Co	Fault Category	art Number	Part Number	art Number	Sales Center	lorkshop Code	Claim ID	Task ID	VIN	MY	Engine	Engine Code	Model Code	Model Name	Rapir Date	Repeat Repair	Production Date	Breakdown	Mileage in 1000	Fault Text Workshop	CU Nr	ware Rele	ware Co	Freq1	PCode1	PCindex1	Freq2	PCode2	PCindex2	Freq3	PCode3	PCindex3	PID	Supplier Nr	upplier Production Da	uction Date C	Remark Quality Dept	upplier Part Number
12-2003.06.27-1-006	genaet nicht auffindbar	9999	No Analysis Performed, Misfire	022	905100		405	024	76971		XXXXXX7OX3H013885	2003	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	28.05.2003	FALSCH	18.03.2003	FALSCH		3 replace coil per VWOA, coils faulty													2820	00154J/0	I 2 19/02	2002/19	Gummi nach unten verschoben	11971esm
11-2003.12.18-1-016	KFF (Analyse VW)	0001	No Trouble Found	06B	905115	J	444	08203	06122-ac		XXXXXX3BX3P27994	2003	1,8 ltr. 125kW	T ULEV	3B3AK5	VW 451 PASSAT	15.10.2003	FALSCH	18.08.2003	FALSCH		6 Mil Lite on					P0300	008		P0304	008				2820	00154J/0	II I 4 45/02	2002/45	Fehler	11967esm
11-2003.12.18-1-017	KFF (Analyse VW)	0001	No Trouble Found	06B	905115	J	444	20155	01238-ac		XXXXXX3BX3P26528	2003	1,8 ltr. 125kW	T ULEV	3B3AK5	VW 451 PASSAT	29.09.2003	FALSCH	19.07.2003	FALSCH		5 Mil Lite on, found #4 Coil misfiring													2820	00154J/0	II I 3 42/02	2002/42	Fehler	11967esm
12-2003.06.27-1-007	KFF (Analyse VW)	0001	No Trouble Found	022	905100		405	024	76971		XXXXXX7OX3H013885	2003	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	28.05.2003	FALSCH	18.03.2003	FALSCH		3 replace coil per VWOA, coils faulty													2820	00154J/0	I 2 19/02	2002/19	Gummi nach unten verschoben	11971esm
12-2003.06.27-1-008	KFF (Analyse VW)	0001	No Trouble Found	022	905100		405	024	76971		XXXXXX7OX3H013885	2003	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	28.05.2003	FALSCH	18.03.2003	FALSCH		3 replace coil per VWOA, coils faulty													2820	00154J/0	I 2 19/02	2002/19	verschoben	11971esm
12-2003.06.27-1-009	KFF (Analyse VW)	0001	No Trouble Found	022	905100		405	024	76971		XXXXXX7OX3H013885	2003	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	28.05.2003	FALSCH	18.03.2003	FALSCH		3 replace coil per VWOA, coils faulty													2820	00154J/0	I 2 19/02	2002/19	verschoben	11971esm
12-2003.08.18-1-076	KFF (Analyse VW)	0001	No Trouble Found	022	905100		420	130	86648		XXXXXX70X2H10942	2002	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	07.05.2003	FALSCH	09.10.2002	FALSCH		15 check eng light flashing					P0306	035		P0302	035		P0301	035	2820	00154J/0	L2 III 6 03/03	2003/03	RT I.O.	11971esm
12-2003.08.18-1-074	KFF (Analyse VW)	0001	No Trouble Found	022	905100		420	130	86648		XXXXXX70X2H10942	2002	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	07.05.2003	FALSCH	09.10.2002	FALSCH		15 check eng light flashing					P0306	035		P0302	035		P0301	035	2820	00154J/0	L2 II 6 03/03	2003/03	RT I.O.	11971esm
12-2003.08.18-1-075	KFF (Analyse VW)	0001	No Trouble Found	022	905100		420	130	86648		XXXXXX70X2H10942	2002	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	07.05.2003	FALSCH	09.10.2002	FALSCH		15 check eng light flashing					P0306	035		P0302	035		P0301	035	2820	00154J/0	L2 III 6 03/03	2003/03	RT I.O.	11971esm
12-2003.06.17-1-004	KFF (Analyse VW)	0001	No Trouble Found	022	905100		426	078	99663		XXXXXX70X2H04212	2002	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	24.04.2003	FALSCH	15.11.2001	FALSCH		34 potential coil problems													2820	00154J/0	II 4 29/01	2001/29		11971esm
12-2003.06.17-1-005	KFF (Analyse VW)	0001	No Trouble Found	022	905100		426	078	99663		XXXXXX70X2H04212	2002	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	24.04.2003	FALSCH	15.11.2001	FALSCH		34 potential coil problems													2820	00154J/0	II 4 29/01	2001/29		11971esm
12-2003.06.17-1-006	KFF (Analyse VW)	0001	No Trouble Found	022	905100		426	078	99663		XXXXXX70X2H04212	2002	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	24.04.2003	FALSCH	15.11.2001	FALSCH		34 potential coil problems													2820	00154J/0	II 4 29/01	2001/29		11971esm
12-2003.06.17-1-007	KFF (Analyse VW)	0001	No Trouble Found	022	905100		426	078	99663		XXXXXX70X2H04212	2002	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	24.04.2003	FALSCH	15.11.2001	FALSCH		34 potential coil problems													2820	00154J/0	II 4 29/01	2001/29		11971esm
12-2003.06.13-1-001	KFF (Analyse VW)	0001	No Trouble Found	07C	905115	C	405	051	97109		XXXXXX3BX3P27412	2003	4,0 ltr. 202kW	k.l.	3B3BV9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH		0													2870	00154J/0	L1 II 6 42/02	2002/42		11964esm
12-2003.06.13-1-002	KFF (Analyse VW)	0001	No Trouble Found	07C	905115	C	405	051	97109		XXXXXX3BX3P27412	2003	4,0 ltr. 202kW	k.l.	3B3BV9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH		0													2870	00154J/0	L1 II 6 42/02	2002/42		11964esm
12-2003.06.17-1-004	KFF (Analyse VW)	0001	No Trouble Found	022	905100		405	024	76971		XXXXXX7OX3H013885	2003	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	28.05.2003	FALSCH	18.03.2003	FALSCH		3 replace coil per VWOA, coils faulty													2820	00154J/0	I 2 19/02	2002/19	Gummi nach unten verschoben	11971esm
12-2003.06.27-1-005	KFF (Analyse VW)	0001	No Trouble Found	022	905100		405	024	76971		XXXXXX7OX3H013885	2003	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	28.05.2003	FALSCH	18.03.2003	FALSCH		3 replace coil per VWOA, coils faulty													2820	00154J/0	I 2 19/02	2002/19	verschoben	11971esm
12-2003.06.27-1-001	KFF (Analyse VW)	0001	No Trouble Found	022	905100		409	449	26873		XXXXXX70X2H05979	2002	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	19.05.2003	FALSCH	29.06.2002	FALSCH		35 start ups				s	P0304	035	s	P0303	035	s	P0301	035	2820	00154J/0	II 6 35/01	2001/35	verschoben	11971esm
12-2003.06.03-1-001	KFF (Analyse VW)	0001	No Trouble Found	06B	905115	J	408	b12	37679		XXXXXX8BX3A26218	2003	1,8 ltr. 125kW	k.l.	8E5S25	AU 452 AUDI A4 AVANT	08.05.2003	FALSCH	12.04.2003	FALSCH		3 eng.lite comes on after car gets wet					P1355	004							2820	00154J/0	L1 III 7 48/02	2002/48		11967esm
12-2003.06.16-1-009	KFF (Analyse VW)	0001	No Trouble Found	06B	905115	J	408	269	60554		XXXXXX1JX3W37656	2003	1,8 ltr. 132kW	k.l.	1J6SP8	VW 342 BORA VARIANT	23.05.2003	FALSCH	15.04.2003	FALSCH		2 starts very rough					P0304	035		P0302	035		P0301	035	2820	00154J/0	L1 III 5 42/02	2002/42		11967esm
12-2003.06.16-1-010	KFF (Analyse VW)	0001	No Trouble Found	06B	905115	J	408	269	60554		XXXXXX1JX3W37656	2003	1,8 ltr. 132kW	k.l.	1J6SP8	VW 342 BORA VARIANT	23.05.2003	FALSCH	15.04.2003	FALSCH		2 starts very rough					P0304	035		P0302	035		P0301	035	2820	00154J/0	L1 III 5 42/02	2002/42		11967esm
12-2003.06.16-1-011	KFF (Analyse VW)	0001	No Trouble Found	06B	905115	J	408	269	60554		XXXXXX1JX3W37656	2003	1,8 ltr. 132kW	k.l.	1J6SP8	VW 342 BORA VARIANT	23.05.2003	FALSCH	15.04.2003	FALSCH		2 starts very rough					P0304	035		P0302	035		P0301	035	2820	00154J/0	L1 III 5 42/02	2002/42		11967esm
12-2003.06.17-1-001	KFF (Analyse VW)	0001	No Trouble Found	022	905100		408	258	09837		XXXXXX70X2H08511	2002	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	24.04.2003	FALSCH	27.06.2002	FALSCH		23 mileage light is illuminated					P0306	035		P0300	035				2820	00154J/0	III 3 44/01	2001/44		11971esm
12-2003.06.17-1-002	KFF (Analyse VW)	0001	No Trouble Found	022	905100		426	078	99663		XXXXXX70X2H04212	2002	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	24.04.2003	FALSCH	15.11.2001	FALSCH		34 potential coil problems													2820	00154J/0	II 4 29/01	2001/29		11971esm
12-2003.06.17-1-003	KFF (Analyse VW)	0001	No Trouble Found	022	905100		426	078	99663		XXXXXX70X2H04212	2002	2,8 ltr. 150kW	4V	7DCMA3	VN 7400 CARAVELLE KURZ	24.04.2003	FALSCH	15.11.2001	FALSCH		34 potential coil problems													2820	00154J/0	II 4 29/01	2001/29		11971esm
12-2003.06.13-1-0031	KFF (Analyse VW)	0001	No Trouble Found	07C	905115	C	405	051	97109		XXXXXX3BX3P27412	2003	4,0 ltr. 202kW	k.l.	3B3BV9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH		0													2870	00154J/0	L1 II 6 42/02	2002/42		11964esm
12-2003.06.13-0041	KFF (Analyse VW)	0001	No Trouble Found	07C	905115	C	405	051	97109		XXXXXX3BX3P27412	2003	4,0 ltr. 202kW	k.l.	3B3BV9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH		0													2870	00154J/0	L1 II 6 42/02	2002/42		11964esm
12-2003.06.13-0051	KFF (Analyse VW)	0001	No Trouble Found	07C	905115	C	405	051	97109		XXXXXX3BX3P27412	2003	4,0 ltr. 202kW	k.l.	3B3BV9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH		0													2870	00154J/0	L1 II 6 42/02	2002/42		11964esm
12-2003.06.13-006	KFF (Analyse VW)	0001	No Trouble Found	07C	905115	C	405	051	97109		XXXXXX3BX3P27412	2003	4,0 ltr. 202kW	k.l.	3B3BV9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH		0													2870	00154J/0	L1 II 6 42/02	2002/42		11964esm
12-2003.06.13-007	KFF (Analyse VW)	0001	No Trouble Found	07C	905115	C	405	051	97109		XXXXXX3BX3P27412	2003	4,0 ltr. 202kW	k.l.	3B3BV9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH		0													2870	00154J/0	L1 II 6 42/02	2002/42		11964esm
12-2003.06.13-0081	KFF (Analyse VW)	0001	No Trouble Found	07C	905115	C	405	051	97109		XXXXXX3BX3P27412	2003	4,0 ltr. 202kW	k.l.	3B3BV9	VW 451 PASSAT	30.04.2003	FALSCH		FALSCH		0													2870	00154J/0	L1 II 6 42/02	2002/42		11964esm
12-2003.08.18-1-0011	KFF (Analyse VW)	0001	No Trouble Found	022	905100	F	424	330	78085		XXXXXX70X2H02754	2002	2,8 ltr. 150kW	4V	7DC2A3	VN 7400 CARAVELLE KURZ	07.07.2003	FALSCH	12.02.2002	FALSCH		13 check engine light on, engine has a miss test													2820	00154J/0	L2.2491 4 20/03	2003/20	RT I.O.	12490esm
12-2003.05.26-1-008	KFF (Analyse VW)	0001	No Trouble Found	06B	905115	J	409	246	40050		XXXXXX3BX3E32165	2003	1,8 ltr. 125kW	T ULEV	3B64K5	VW 452 PASSAT VARIANT	01.05.2003	FALSCH	19.04.2003	FALSCH		1 check eng light on													2820	00154J/0	L1 II 6 41/02	2002/41		11967esm
12-2003.06.03-1-002	KFF (Analyse VW)	0001	No Trouble Found	06B	905115	J	408	b12	37679		XXXXXX8BX3A26218	2003	1,8 ltr. 125kW	k.l.	8E5S25	AU 452 AUDI A4 AVANT	08.05.2003	FALSCH	12.04.2003	FALSCH		3 eng.lite comes on after car gets wet					P1355	004							2820	00154J/0	L1 III 7 48/02	2002/48		11967esm
12-2003.06.03-1-003	KFF (Analyse VW)	0001	No Trouble Found	06B	905115	J	408	b12	37679		XXXXXX8EX3A26218	2003	1,8 ltr. 125kW	k.l.	8E5S25	AU 452 AUDI A4 AVANT	08.05.2003	FALSCH	12.04.2003	FALSCH		3 eng.lite comes on after car gets wet					P1355	004							2820	00154J/0	L1 III 7 48/02	2002/48		11967esm
12-2003.06.03-1-004	KFF (Analyse VW)	0001	No Trouble Found	06B	905115	J	408	b12	37679		XXXXXX8EX3A26218	2003	1,8 ltr. 125kW	k.l.	8E5S25	AU 452 AUDI A4 AVANT	08.05.2003	FALSCH	12.04.2003	FALSCH		3 eng.lite comes on after car gets wet					P1355	004							2820	00154J/0	L1 III 7 48/02	2002/48		11967esm
11-2005.04.28-1-011	KFF (Analyse VW)	0001	No Trouble Found	06B	905115	L	425	157	47835	47835	3VWCD31Y54M333947	2004	1,8 ltr.	k.l.	1Y75N4	VW NEW BEETLE	23.12.2004	FALSCH	28.05.2004	FALSCH		16 misfire all 4 cylinders					P0300	035		P0301	035		P0303	035	2820	00154J/0	L1 Ic3 1 43/03	2003/43	optisch i.O., Anzahl SF pro Antrag: 3	
12-2005.01.18-1-012	KFF (Analyse VW)	0001	No Trouble Found	022	905100	H	409	412	265246	65246AC	ZG77L05D019168	2005	3,2 ltr. 162kW	k.l.	a.l.	VW 756 TOUAREG	24.01.2004	FALSCH		FALSCH		1 Misfire					P0305	001		P0301	001				2820	00154J/0	L2 D39F 6 36/03	2003/36	Keine elektr.Besonderheiten, optisch i.O.	12492esm
12-2005.01.18-1-013	KFF (Analyse VW)	0001	No Trouble Found	022	905100	H	409	412	265246	65246AC	ZG77L05D019168	2005	3,2 ltr. 162kW	k.l.	a.l.	VW 756 TOUAREG	24.01.2004	FALSCH		FALSCH		1 Misfire					P0305	001		P0301	001				2820	00154J/0	L2 D3AO 6 36/03	2003/36	Keine elektr.Besonderheiten, optisch i.O.	12492esm
12-2005.01.18-1-014	KFF (Analyse VW)	0001	No Trouble Found	022	905100	H	409	412	265246	65246AC	ZG77L05D019168	2005	3,2 ltr. 162kW	k.l.	a.l.	VW 756 TOUAREG	24.01.2004	FALSCH		FALSCH		1 Misfire					P0305	001		P0301	001				2820	00154J/0	L2 D3C3 6 36/03	2003/36	Keine elektr.Besonderheiten, optisch i.O.	12492esm
12-2005.04.28-1-010	KFF (Analyse VW)	0001	No Trouble Found	06B	905115	L	425	157	47835	47835	3VWCD31Y54M333947	2004	1,8 ltr.	k.l.	1Y75N4	VW NEW BEETLE	23.12.2004	FALSCH	28.05.2004	FALSCH		16 misfire all 4 cylinders					P0300	035		P0301	035		P0303	035	2820	00154J/0	L1 Ic2 9 43/03	2003/43	optisch i.O., Anzahl SF pro Antrag: 3	
12-2005.01.18-1-006	KFF (Analyse VW)	0001	No Trouble Found	022	905100	H	409	412	265246	65246AC	ZG77L05D019168	2005	3,2 ltr. 162kW	k.l.	a.l.	VW 756 TOUAREG	24.01.2004	FALSCH		FALSCH		1 Misfire					P0305	001		P0301	001				2820	00154J/0	L2 D3C3 6 36/03	2003/36	Keine elektr.Besonderheiten, optisch i.O.	12492esm
12-2005.01.18-1-007	KFF (Analyse VW)	0001	No Trouble Found	022	905100	H	409	412	265246	65246AC	ZG77L05D019168	2005	3,2 ltr. 162kW	k.l.	a.l.	VW 756 TOUAREG	24.01.2004	FALSCH		FALSCH		1 Misfire					P0305	001		P0301	001				2820	00154J/0	L2 D3C8 6 36/03	2003/36	Keine elektr.Besonderheiten, optisch i.O.	12492esm
12-2005.01.18-1-008	KFF (Analyse VW)	0001	No Trouble Found	022	905100	H	409	412	265246	65246AC	ZG77L05D019168	2005	3,2 ltr. 162kW	k.l.	a.l.	VW 756 TOUAREG	24.01.2004	FALSCH		FALSCH		1 Misfire					P0305	001		P0301	001				2820	00154J/0	L2 J3F0 5 50/03	2003/50	Keine elektr.Besonderheiten, optisch i.O.	12492esm
12-2005.01.18-1-010	KFF (Analyse VW)	0001	No Trouble Found	022	905100	H	409	412	265246	65246AC	ZG77L05D019168	2005	3,2 ltr. 162kW	k.l.	a.l.	VW 756 TOUAREG	24.01.2004	FALSCH		FALSCH		1 Misfire					P0305	001		P0301	001				2820	00154J/0	L2 D3BC 6 36/03	2003/36	Keine elektr.Besonderheiten, optisch i.O.	12492esm
12-2005.01.18-1-011	KFF (Analyse VW)	0001	No Trouble Found	022	905100	H	409	412	265246	65246AC	ZG77L05D019168	2005	3,2 ltr. 162kW	k.l.	a.l.	VW 756 TOUAREG	24.01.2004	FALSCH		FALSCH		1 Misfire					P0305	001		P0301	001				2820	00154J/0	L2 D3CB 6 36/03	2003/36	Keine elektr.Besonderheiten, optisch i.O.	12492esm
12-2006.11.09-1-002	KFF (Analyse VW)	06B	905115	N	402	125	69944		WVWAD63B15P051577	2005	5V Turbo	k.l.		VW 756 TOUAREG	17.10.2006	FALSCH	20.12.2004	FALSCH		60 MIL on					P0304	001								05/54J/0	LL1 Ia7a 5 37/04	2004/37	Feuchtigkeitssspuren, Anzahl SF pro Antrag: 1	12472esm
11-2007.06.14-1-046	KFF (Analyse VW)	0001	No Trouble Found	022	905100	T	408	376	77853ac		WVGZE77L37D000090	2006	3,6 ltr. 206kW	BHK	7LABE1	VW TOUAREG	30.01.2007	FALSCH	09.03.2006	FALSCH		10 Check engine light is on					P0300	001		P0303	001		P0306	001	2820	00154J/0	L2 6483 5 03/06	2006/03	Antrag: 1	12448esm
11-2007.06.14-1-047	KFF (Analyse VW)	07K	905715	B	402	141	21814ac		3VWRW61Z77M501184	2006	2,5 ltr. 110kW	BPY	1C1S5A	VW JETTA	13.02.2007	FALSCH	17.07.2006	FALSCH		11 Check engine light is on					P0300	001		P0304	001				2820	07504J/0	035 I 4 07/06	2006/07	Stecker,bei RT i.O, Anzahl SF pro Antrag: 1	72823012
11-2007.06.14-1-024	KFF (Analyse VW)	07K	90571 5	B	422	600	93540BC		3VWXJ71K67M042967	2007	2,0 ltr. 147kW	BPY	1K2BV2	VW JETTA	17.01.2007	FALSCH	27.09.2006	FALSCH		4 Batt. Lamp is on during cold Start up													2820	07504J/0	03I5 III 1 23/06	2006/23	Antrag: 4	78230012
11-2007.06.14-1-025	KFF (Analyse VW)	07K	90571 5	B	422	600	93540BC		3VWXJ71K67M042967	2007	2,0 ltr. 147kW	BPY	1K2BV2	VW JETTA	17.01.2007	FALSCH	27.09.2006	FALSCH		4 Batt. Lamp is on during cold Start up													2820	07504J/0	20I3 II 4 23/06	2006/23	Antrag: 4	78230012
11-2007.06.14-1-026	KFF (Analyse VW)	07K	90571 5	B	422	600	93540BC		3VWXJ71K67M042967	2007	2,0 ltr. 147kW	BPY	1K2BV2	VW JETTA	17.01.2007	FALSCH	27.09.2006	FALSCH		4 Batt. Lamp is on during cold Start up													2820	07504J/0	20I3 III 1 23/06	2006/23	Antrag: 4	78230012
11-2007.06.14-1-027	KFF (Analyse VW)	07K	90571 5	B	426	109	75157ac		WVWEV71K77W044066	2007	2,0 ltr. 147kW	BPY	1K19V2	VW GOLF GTI	06.02.2007	FALSCH	19.07.2006	FALSCH		4 runs rough					P0303	001							2820	07504J/0	20I3 II 4 23/06	2006/23	Antrag: 4	78230012
11-2007.06.14-1-028	KFF (Analyse VW)	07K	90571 5	B	426	109	75157ac		WVWEV71K77W044066	2007	2,0 ltr. 147kW	BPY	1K1L9V2	VW GOLF GTI	06.02.2007	FALSCH	19.07.2006	FALSCH		4 runs rough					P0303	001							2820	07504J/0	20I3 III 1 23/06	2006/23	Antrag: 4	78230012
12-2007.06.14-1-029	KFF (Analyse VW)	07K	90571 5	B	401	017	21590ac		3VWWJ71K67M035405	2007	2,0 ltr. 147kW	BPY	1K2BV2	VW JETTA	25.01.2007	FALSCH	04.09.2006	FALSCH		1 Batt. Lamp is on													2820	07504J/0	03I5 III 1 23/06	2006/23	Antrag: 3	78230012
12-2007.06.14-1-030	KFF (Analyse VW)	07K	90571 5	B	401	017	21590ac		3VWWJ71K67M035405	2007	2,0 ltr. 147kW	BPY	1K2BV2	VW JETTA	25.01.2007	FALSCH	04.09.2006	FALSCH		1 Batt. Lamp is on													2820	07504J/0	03I5 III 1 23/06	2006/23	Antrag: 3	78230012
12-2007.06.14-1-031	KFF (Analyse VW)	07K	90571 5	B	401	017	21590ac		3VWWJ71K67M035405	2007	2,0 ltr. 147kW	BPY	1K2BV2	VW JETTA	25.01.2007	FALSCH	04.09.2006	FALSCH		1 Batt. Lamp is on													2820	07504J/0	03I5 III 1 23/06	2006/23	Antrag: 3	78230012
12-2007.06.14-1-032	KFF (Analyse VW)	07K	90571 5	B	402	128	22131		3VWBJ71K37M030192	2007	2,0 ltr. 147kW	BPY	a.l.	VW JETTA	10.01.2007	FALSCH	29.08.2006	FALSCH		7 Batt. Lamp is on inter. 10 sec.													2820	07504J/0	06I5 II 2 21/06	2006/21	Antrag: 4	78230012
12-2007.06.14-1-033	KFF (Analyse VW)	07K	90571 5	B	402	128	22131		3VWBJ71K37M030192	2007	2,0 ltr. 147kW	BPY	a.l.	VW JETTA	10.01.2007	FALSCH	29.08.2006	FALSCH		7 Batt. Lamp is on inter. 10 sec.													2820	07504J/0	06I5 II 2 21/06	2006/21	Antrag: 4	78230012
12-2007.06.14-1-034	KFF (Analyse VW)	07K	90571 5	B	402	128	22131		3VWBJ71K37M030192	2007	2,0 ltr. 147kW	BPY	a.l.	VW JETTA	10.01.2007	FALSCH	29.08.2006	FALSCH		7 Batt. Lamp is on inter. 10 sec.													2820	07504J/0	06I5 II 2 21/06	2006/21	Antrag: 4	78230012
12-2007.06.14-1-035	KFF (Analyse VW)	07K	90571 5	B	402	128	22131		3VWBJ71K37M030192	2007	2,0 ltr. 147kW	BPY	a.l.	VW JETTA	10.01.2007	FALSCH	29.08.2006	FALSCH		7 Batt. Lamp is on inter. 10 sec.													2820	07504J/0	06I5 II 2 21/06	2006/21	Antrag: 4	78230012
12-2007.06.14-1-036	KFF (Analyse VW)	07K	90571 5	B	424	125	02224ac		3VWDF71K77M010392	2007	2,5 ltr. 110kW	BGP	1K27R3	VW JETTA	18.12.2006	FALSCH	12.07.2006	FALSCH		4 Check engine light is on					P0300	001		P0301	001				2820	07504J/0	17I1 I H 17/06	2006/17	Antrag: 2	78230012
12-2007.06.14-1-037	KFF (Analyse VW)	07K	90571 5	B	424	125	02224ac		3VWDF71K77M010392	2007	2,5 ltr. 110kW	BGP	1K27R3	VW JETTA	18.12.2006	FALSCH	12.07.2006	FALSCH		4 Check engine light is on					P0300	001		P0301	001				2820	07504J/0	17I1 I H 17/06	2006/17	Antrag: 2	78230012
11-2007.06.14-1-048	KFF (Analyse VW)	022	905100	S	405	089	18442ac		WVGZE77L67D001671	2006	3,6 ltr. 206kW	BHK	7LABE1	VW TOUAREG	15.03.2007	FALSCH	09.05.2006	FALSCH		40 Check engine light is on					P0300	001		P0305	001		P1367	004	2820	00154J/0	L2 BD79 5 13/06	2006/13	1	12456esm
11-2007.06.14-1-049	KFF (Analyse VW)	022	905100	S	405	244	77746ac		WVGZE77L77D014039	2007	3,6 ltr. 206kW	BHK	7LABE1	VW TOUAREG	22.07.2007	FALSCH	25.07.2006	FALSCH		4 Check engine light is on and flashing					P0302	035		P0304	008				2820	00154J/0	L2 40FE 5 26/06	2006/26	Antrag: 1	12456esm
11-2007.06.14-1-056	KFF (Analyse VW)	07K	905715	B	408	139	92578ac		WWLK73C37E007527	2006	2,0 ltr. 147kW	BPY	3C55K6	VW PASSAT	19.12.2006	FALSCH	09.03.2006	FALSCH		1 Check engine light is on					P0300	001		P0301	001		P1355	004	2820	07504J/0	07I1 III 3 05/06	2006/05	pro Antrag: 1	78230012
11-2007.06.14-1-038	KFF (Analyse VW)	07K	905715	B	401	025	8460ac		3VWW71K27M035370	2007	2,0 ltr. 147kW	BPY	1K28V2	VW JETTA	28.02.2007	FALSCH	04.09.2006	FALSCH		4 Batt. Lamp is on													2820	07504J/0	03I4 III 1 23/06	2006/23	Antrag: 4	78230012
11-2007.06.14-1-039	KFF (Analyse VW)	07K	905715	B	401	025	8460ac		3VWW71K27M035370	2007	2,0 ltr. 147kW	BPY	1K28V2	VW JETTA	28.02.2007	FALSCH	04.09.2006	FALSCH		4 Batt. Lamp is on													2820	07504J/0	03I4 III 1 23/06	2006/23	Antrag: 4	78230012
11-2007.06.14-1-040	KFF (Analyse V

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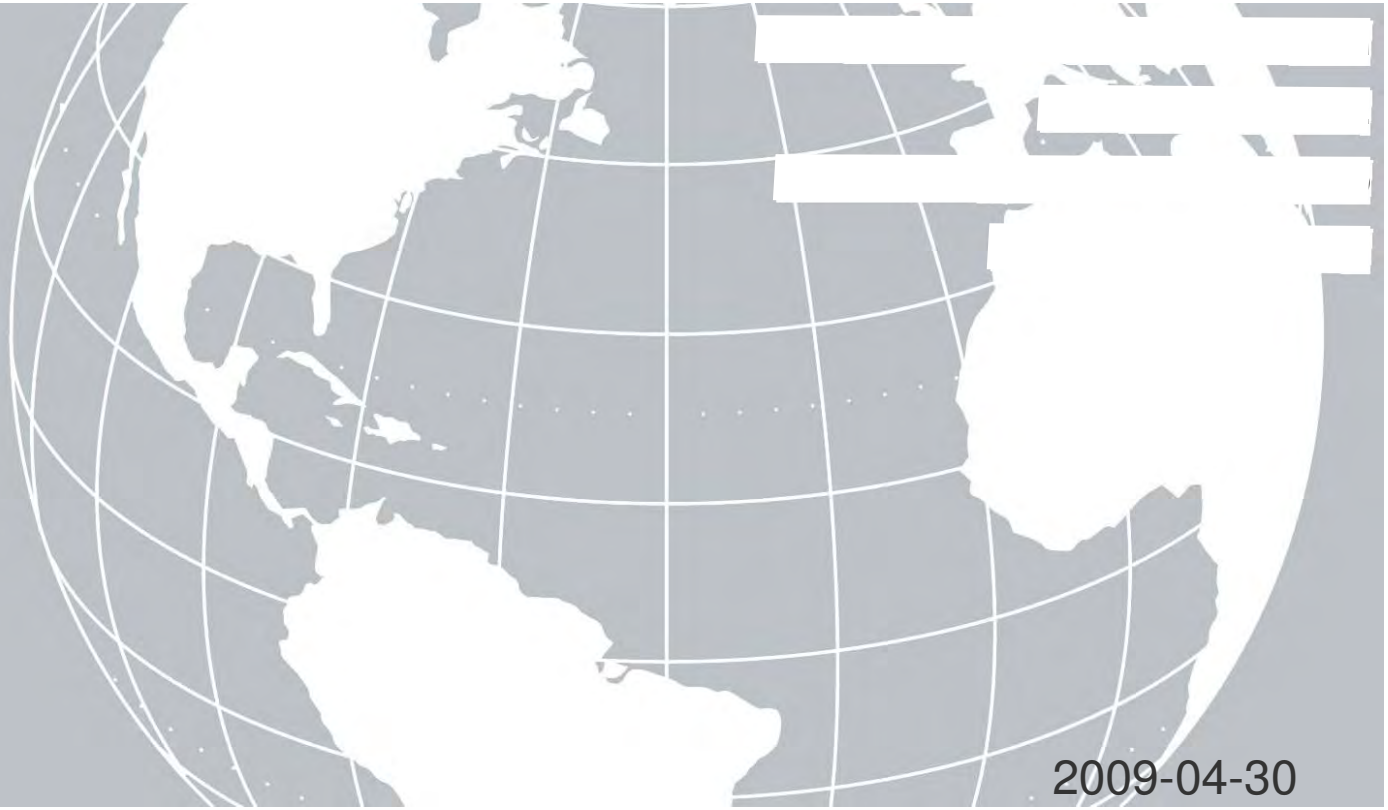
11-Z-09-01014
SZS USA Fake



2009-04-30

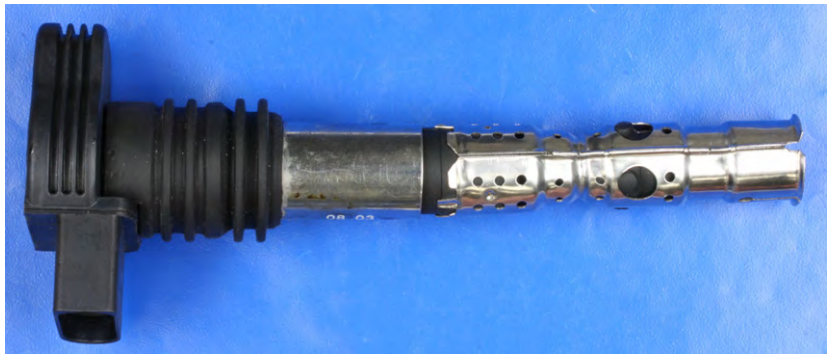
Aufgabenstellung:

Im Raum USA sind die ersten Nachbauten von Stabzündspulen aufgetaucht, die den VW-Originalersatzteilen zum Verwechseln ähnlich sehen; allerdings fehlen wichtige Details wie z.B. die Teilenummer. Im Rahmen dieses LIMS-Auftrages sollen diese Nachbauten mit Original-VW-Teilen verglichen werden.

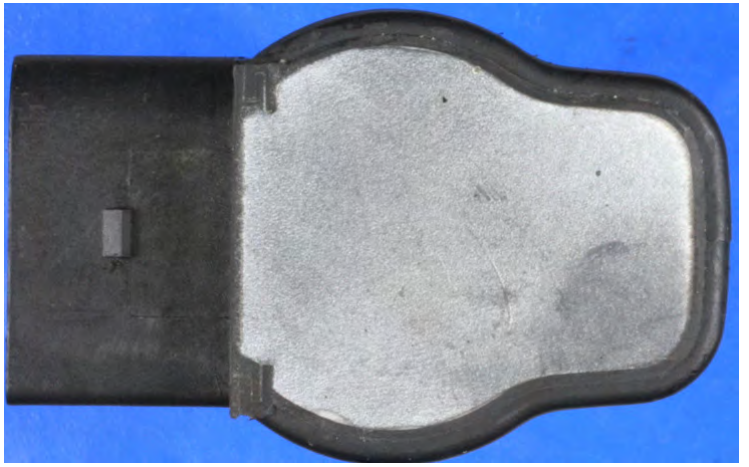
Labor

1014_1

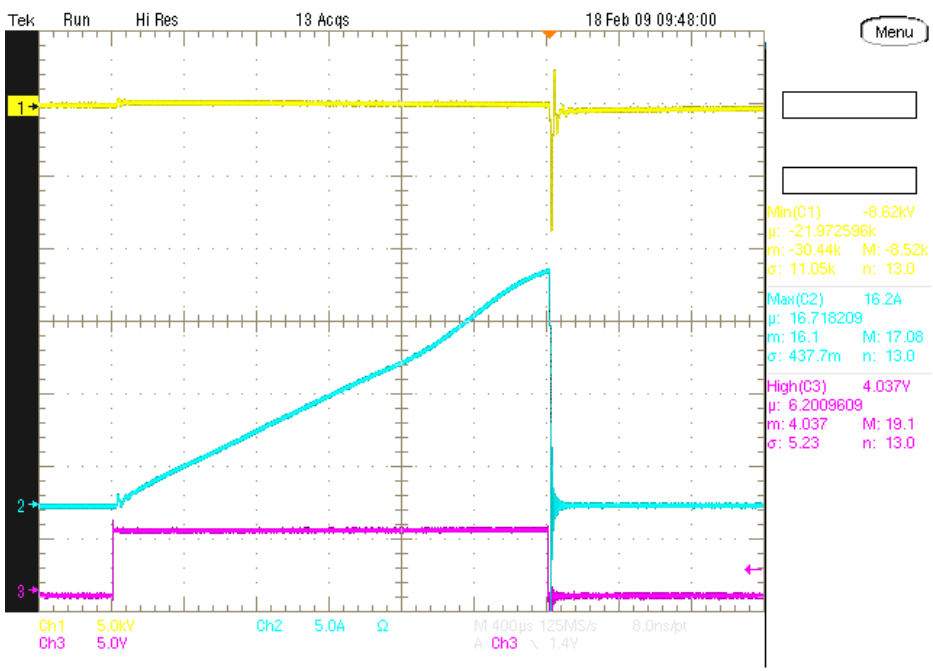
Keine Nest-
Kennzeichnung



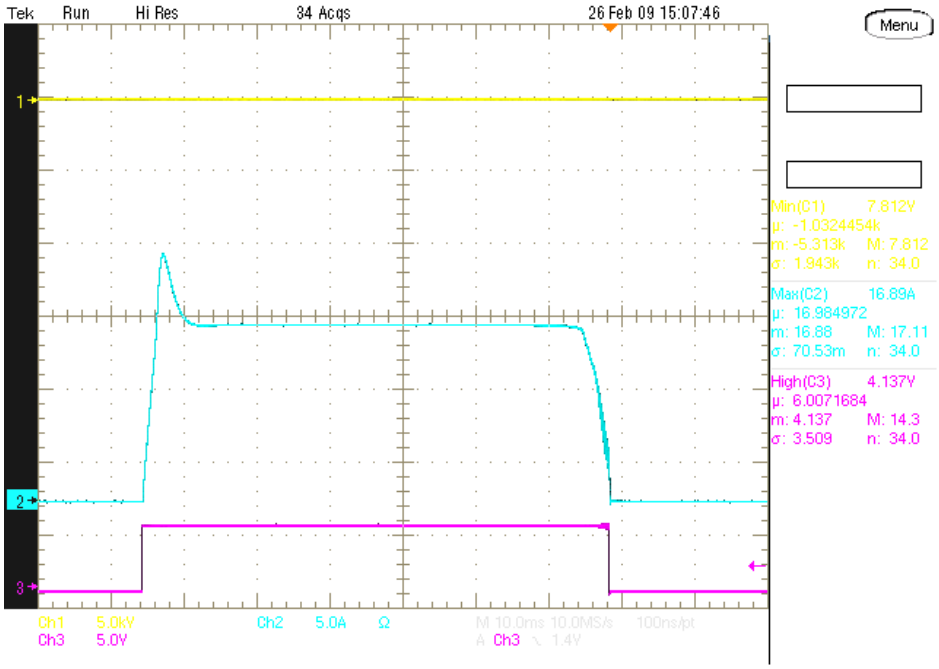
Keine
Beschriftung



1014_1
elektrischer Betrieb

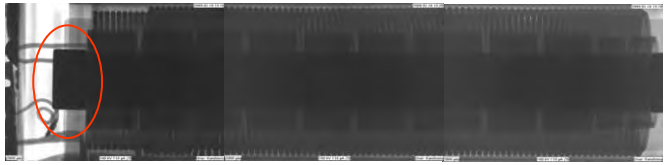


Betrieb mit 2,4ms Ladezeit,
U sekundär zu gering: 8kV

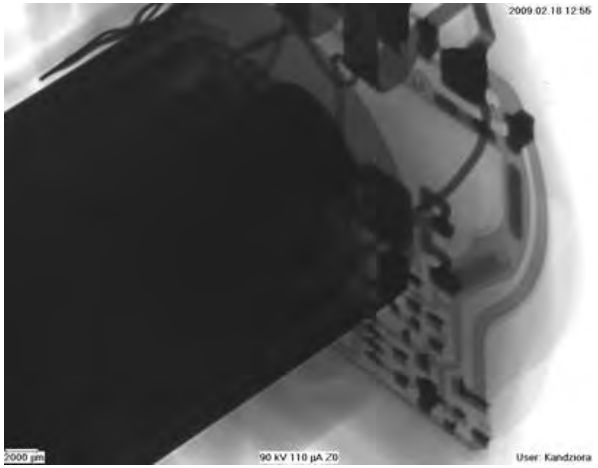


Betrieb mit 64 ms Ladezeit,
soft shutdown vorhanden
(Spule wird abgeschaltet)

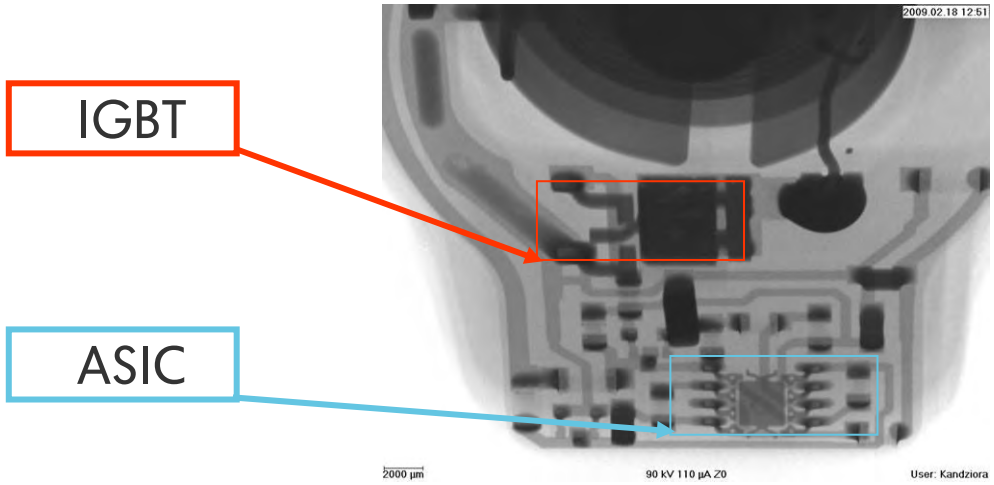
1014_1
X-Ray



Spulenwicklung: Permanentmagnet ragt
über die Wicklung hinaus
(Markierung: auf der 0V Seite)



Freidraht Verbindungen direkt
vom Steckerpins zur Spule

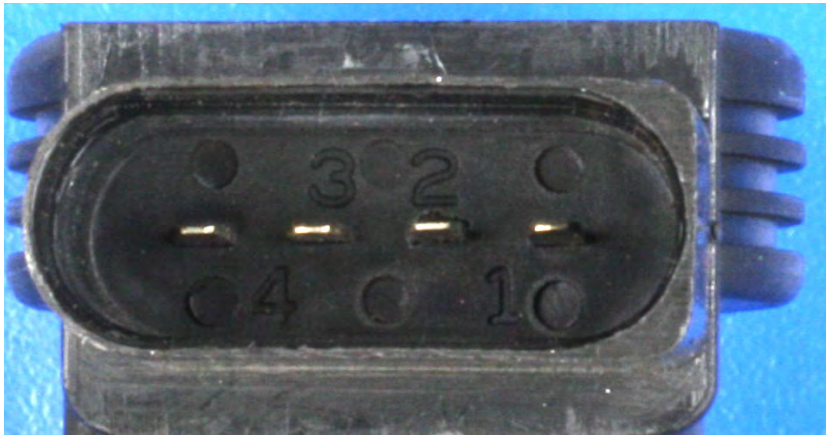


Der ASIC dient vermutlich zur Ansteuerung des IGBT.

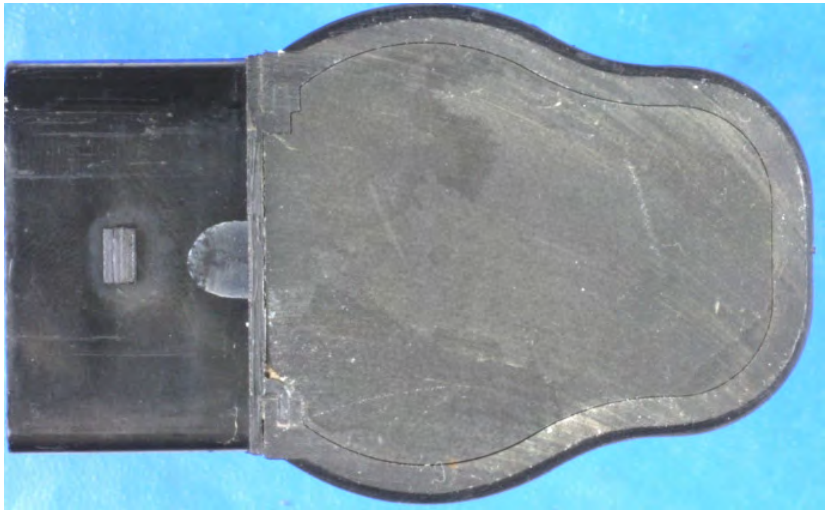
Labor

1014_2

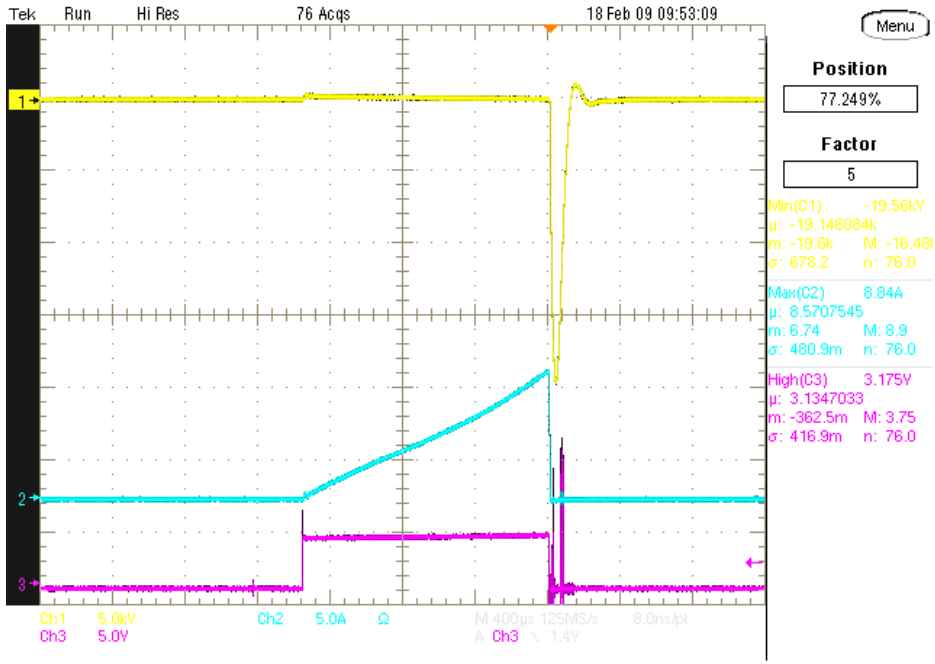
Keine Nest-Kennzeichnung



Keine Beschriftung

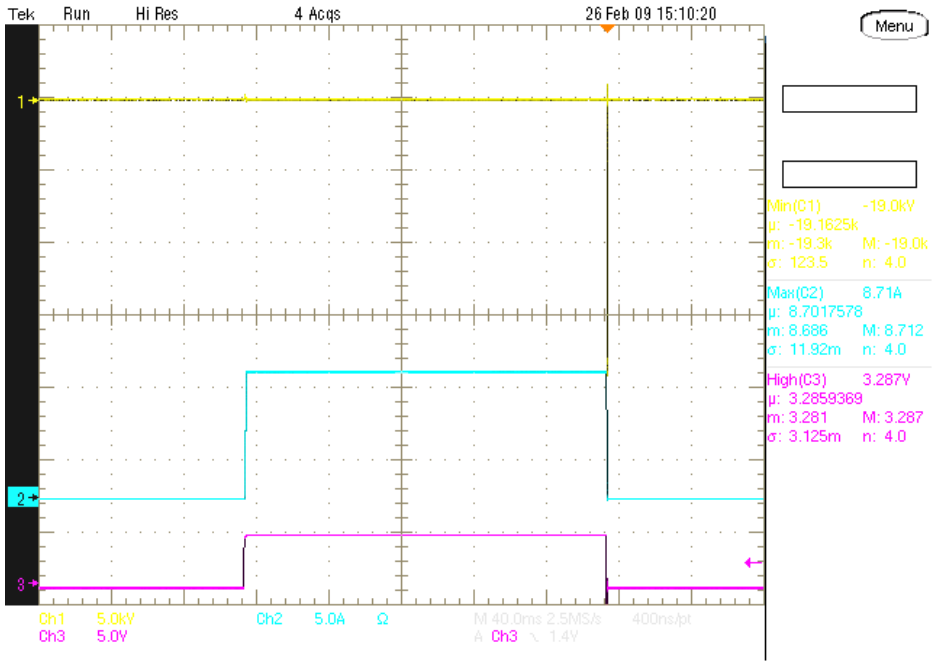


1014_2
elektrischer Betrieb



Betrieb mit 1,36ms Ladezeit,
bei dieser Zeit ist das Spulensystem schon gesättigt

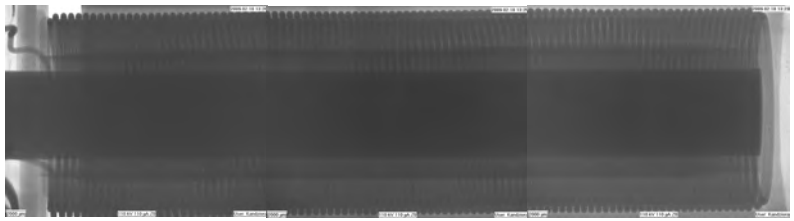
U sekundär zu gering: 19,58 kV



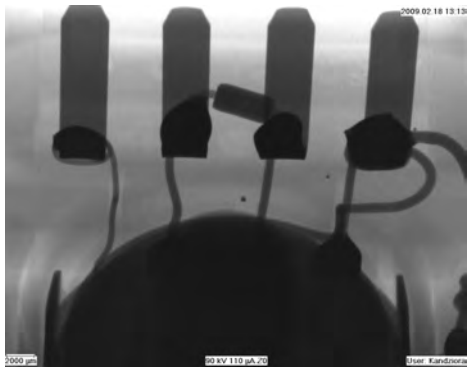
Betrieb mit 200 ms Ladezeit,
soft shutdown nicht vorhanden

(Daueransteuerung führt zur Überbestromung)

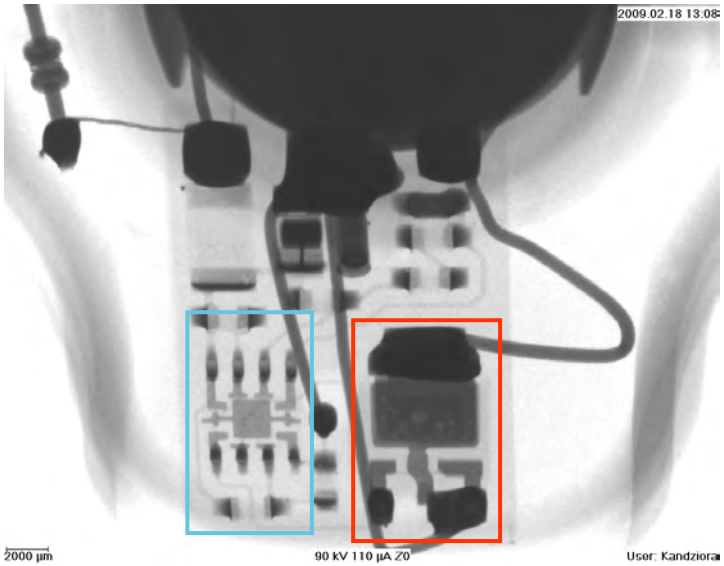
1014_2
X-Ray



Kein Permanentmagnet vorhanden,
Spulenkern ragt hinaus der Spulensystems,
Pilgerschrittwicklung



Freidraht Verbindungen direkt
vom Steckerpins zur Spule



ASIC

IGBT

Der ASIC dient vermutlich zur Ansteuerung des IGBT.

11-Z-09-01014
SZS USA Fake

2009-04-30

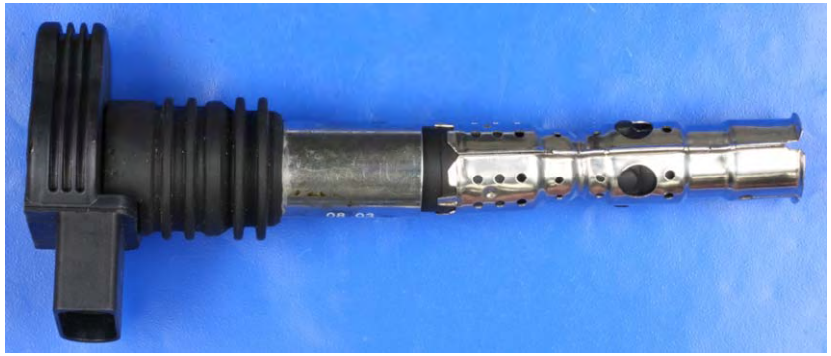
Task:

The first reverse engineered ignition coils have turned up on the USA market that look confusingly similar to VW genuine parts; except that certain important details are missing, such as the part number, for example. The ignition coils should therefore be compared with original VW parts as part of this LIMS task.

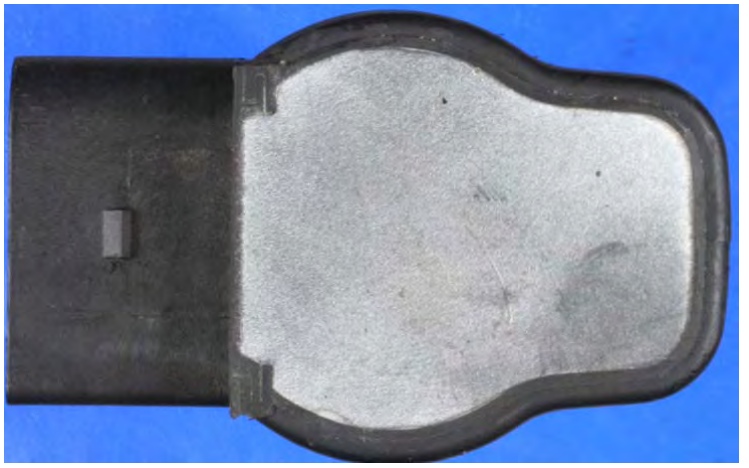
Laboratory

1014_1

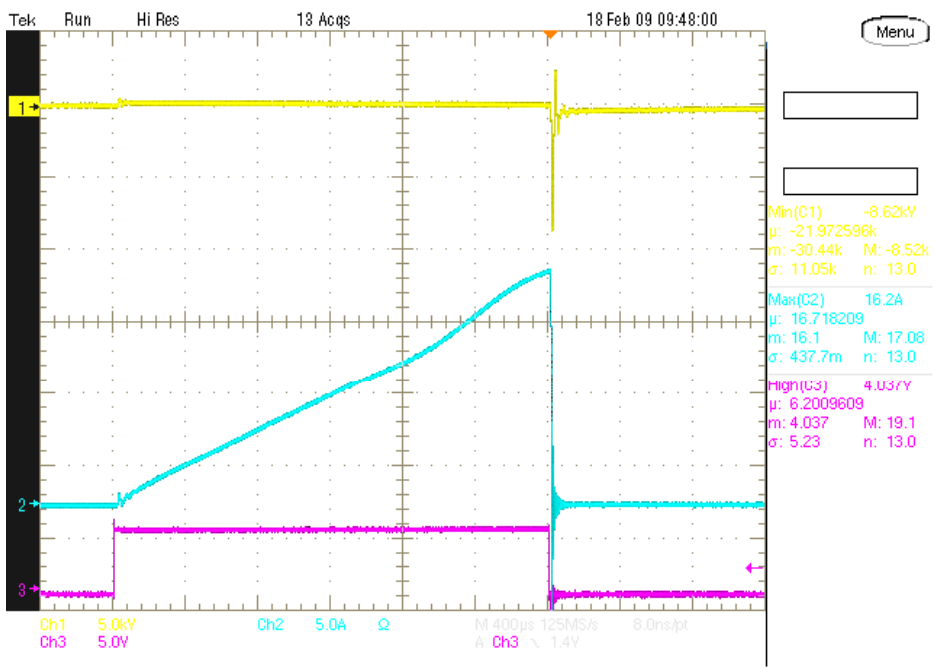
No nest identification



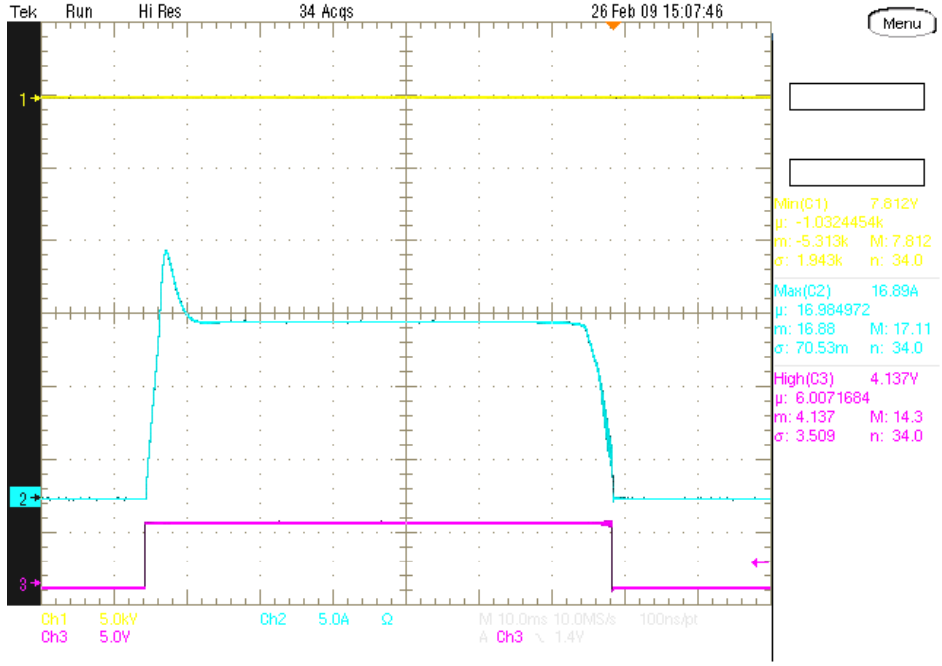
No label



1014_1
electrical operation

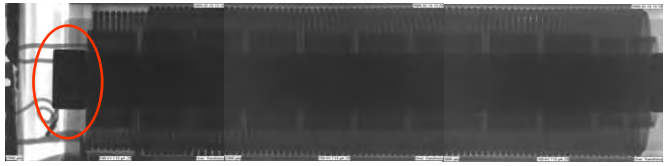


Operation with 2.4ms charge time,
U secondary too low: 8kV

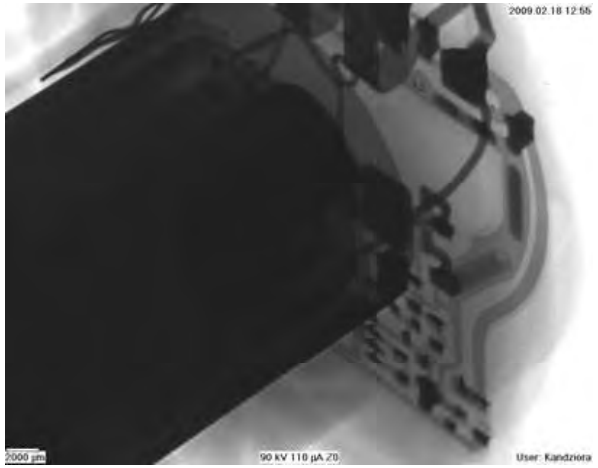


Operation with 64 ms charge time,
soft shutdown available
(coil is switched off)

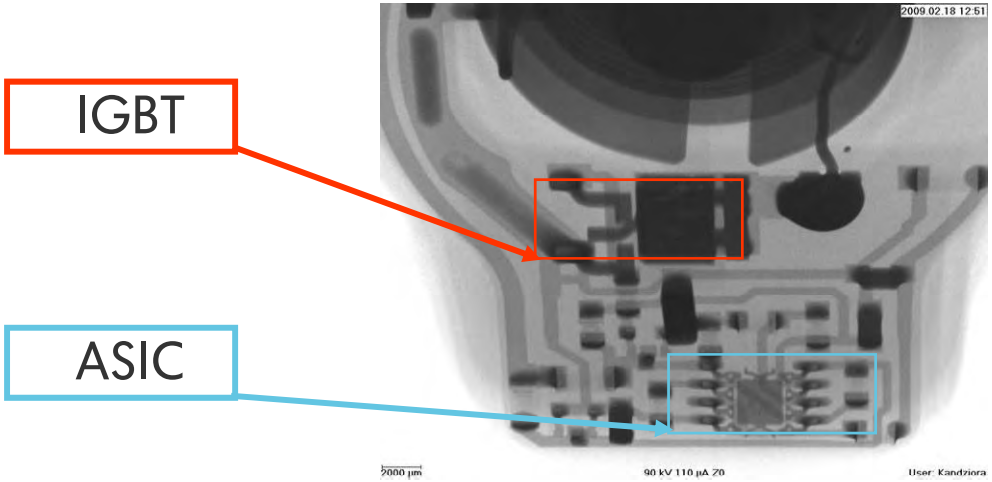
1014_1
X-ray



Wire wound coil: permanent magnet
protrudes over the winding
(Mark: on the 0V side)



Free-wire connections directly
from the plug pins to the coil

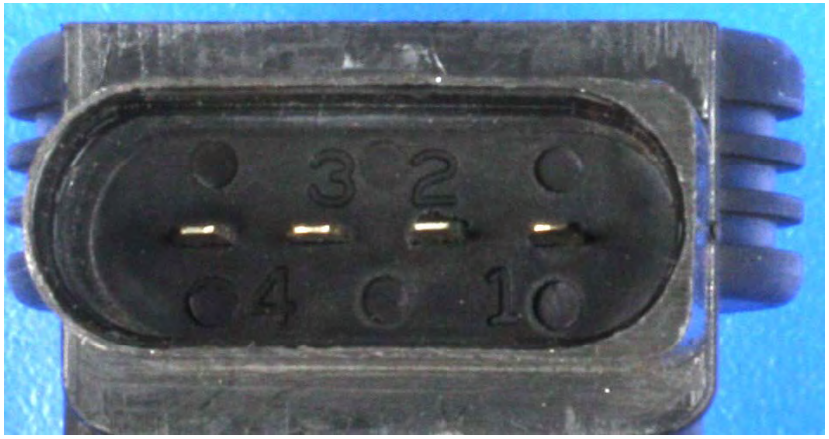


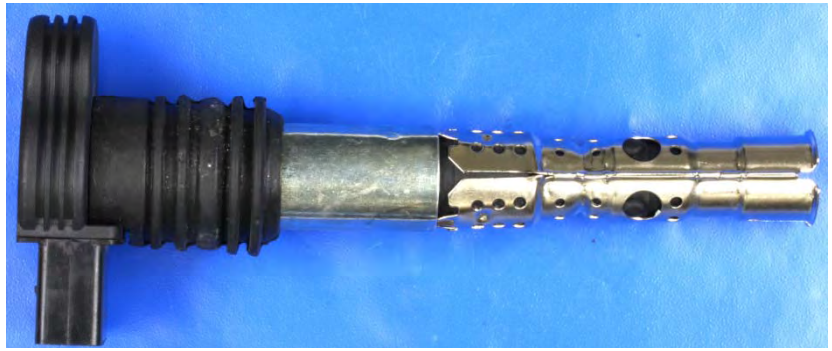
The ASIC presumably serves as the control of the IGBT.

Laboratory

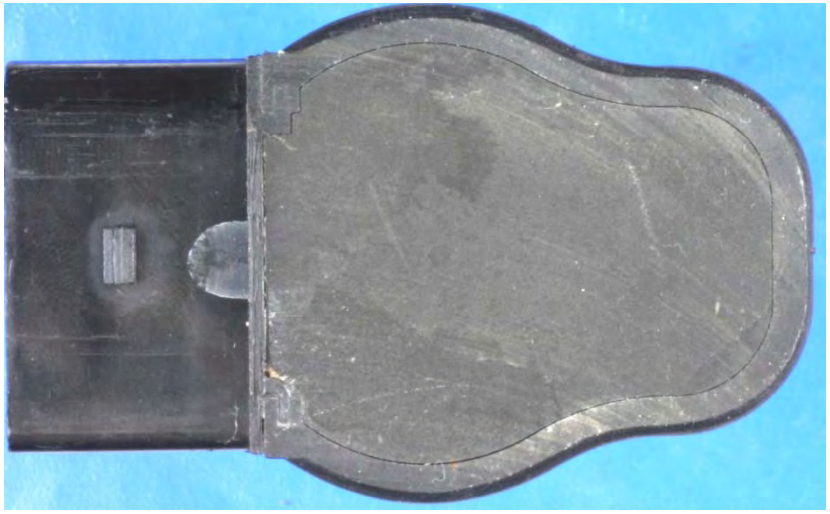
1014_2

No nest identification

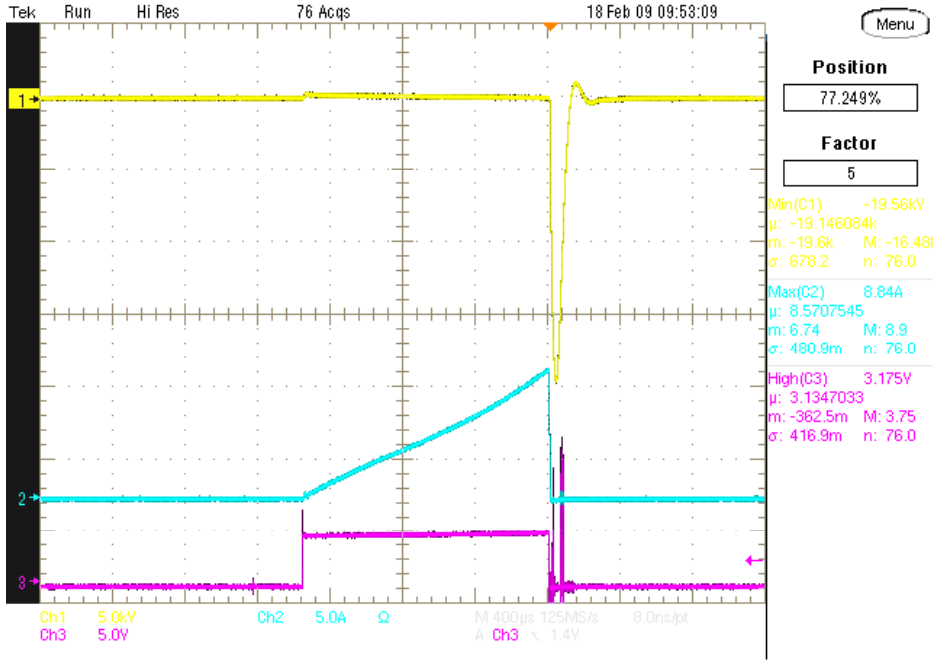




No label

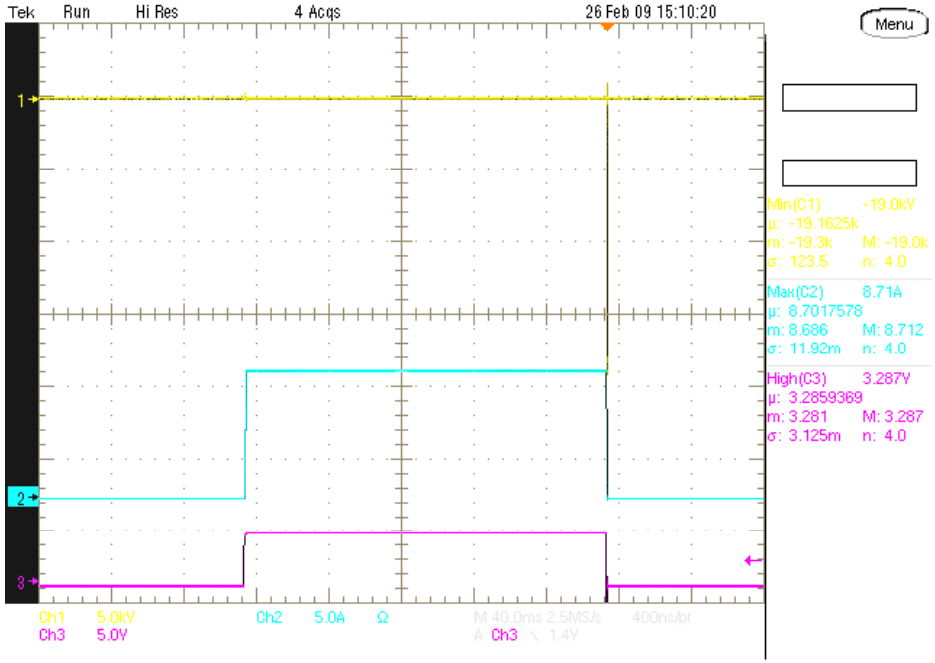


1014_2
electrical operation



Operation with 1.36ms charge time,
with this time the coil system is already saturated

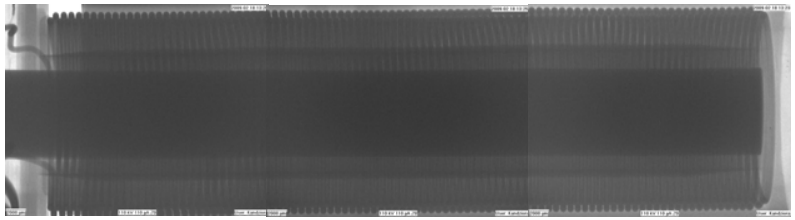
U secondary too low: 19.58 kV



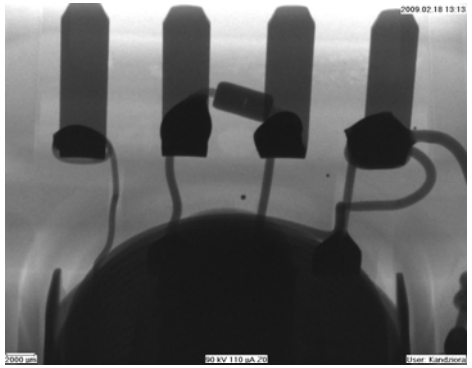
Operation with 200 ms charge time,
soft shutdown not available

(Continuous control leads to
overexcitation)

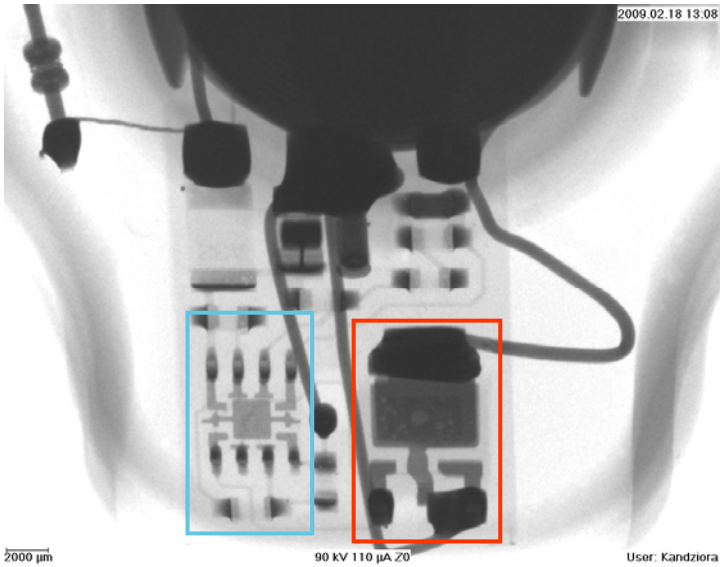
1014_2
X-ray



No permanent magnet available,
coil core protrudes over the coil system,
backstep sequence



Free-wire connections directly
from the plug pins to the coil



ASIC IGBT

The ASIC presumably serves as the control of the IGBT.

Nachgebaute Stabzündspulen im Markt USA

Entwurf		Zwischenbericht Nr.	x Abschlussbericht	Anzahl Zwischenberichte:	
Teilenummer	Benennung	Zeichnungsdatum	Lieferant		Note
.06B.905.115.N	Stabzündspule				-

1 Aufgabenstellung

Im Raum USA sind die ersten Nachbauten von Stabzündspulen aufgetaucht, die den VW-Orginalersatzteilen zum Verwechseln ähnlich sehen; allerdings fehlen wichtige Details wie z.B. die Teilenummer. Im Rahmen dieses LIMS-Auftrages sollen diese Nachbauten mit Orignal-VW-Teilen verglichen werden.

2 Zusammenfassung

Die Teile ähneln optisch den VW FSI-Spulen: 06B 905 115. Bei den Teilen -1;-2:-4 waren die Strom und Spannungsverläufe ähnlich den original Teilen (leicht erhöhter Primärstromverlauf bei vergleichbarer Sekundärspannung). Nur bei dem Teil -3 weicht die sekundäre Spannung stark von dem originalem Verlauf ab, vermutlich aufgrund eines fehlenden Permanentmagneten an der HV Seite.

3 Einzelergebnisse

- **Optische Begutachtung**

Laserbeschriftung am Steckerdom:
Spule-1 081101AK
Spule -2 081101AK
Spule -3 keine Beschriftung am Spulenkopf
Spule -4 081101AK

Abbildung 1: Spulenverpackung

Alle vier Spulen waren einzeln in der in Abb. 1 dargestellten Verpackung verpackt.

Bildablage:

Abbildung 2:Spulenkopf Übersicht

Abbildung 3: Spulenübersicht, Markierung: unterschiedliche Lage des Rückschlußblechs

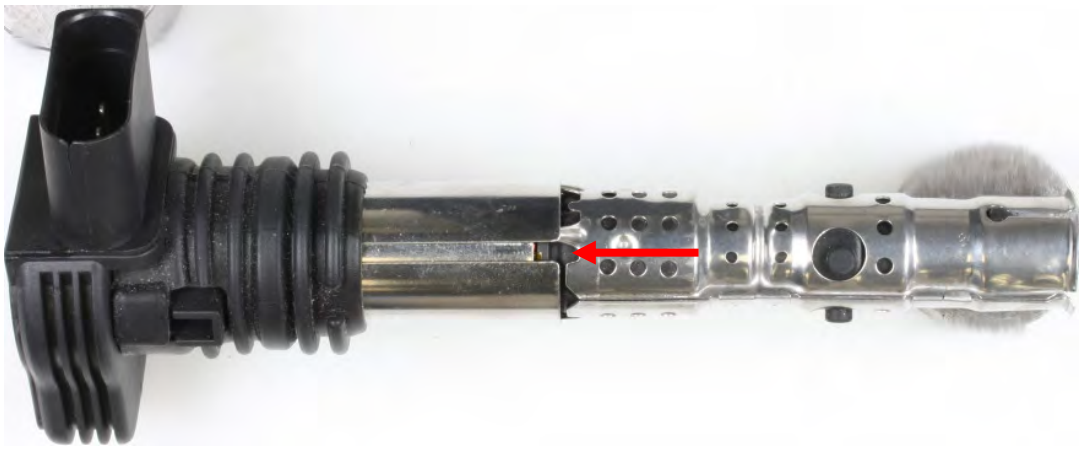
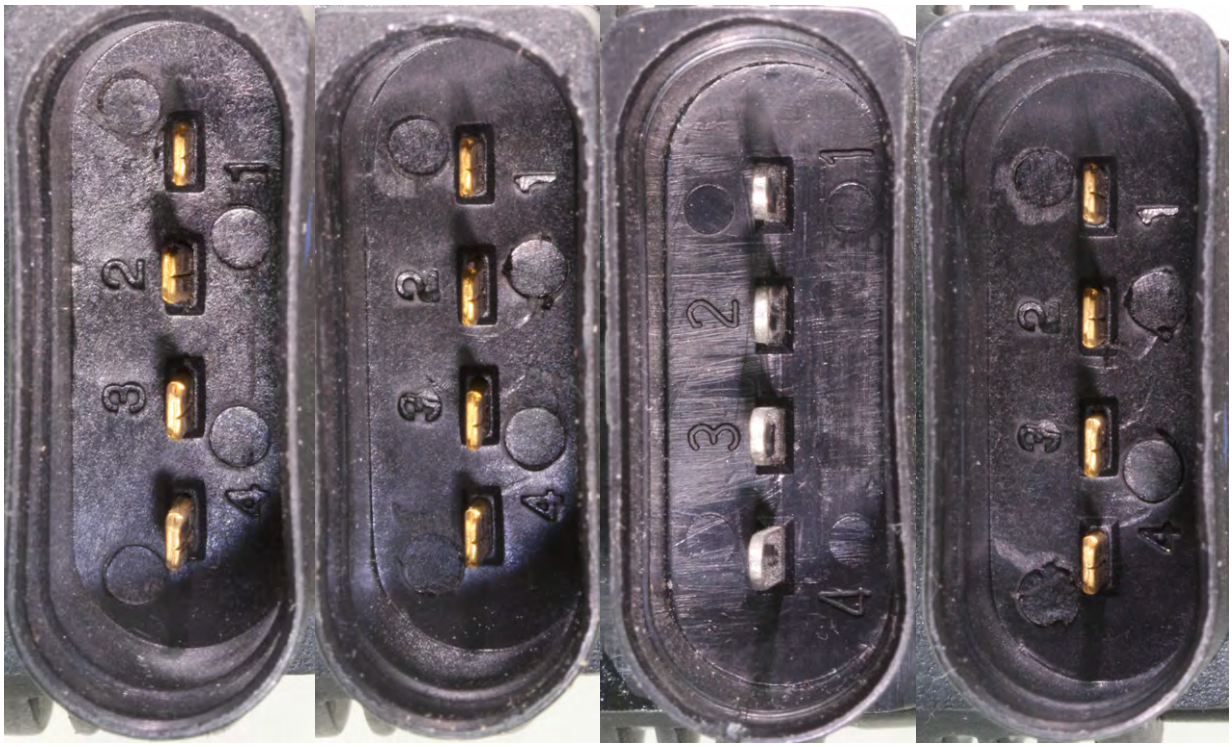


Abbildung 4: Spule -3 Spalt am Rückschlussblech um 130° verschoben



-1	-2	-3	-4
Kontakte aus Messing	Messing	Verzinnt	Messing

Abbildung 5: Stecker

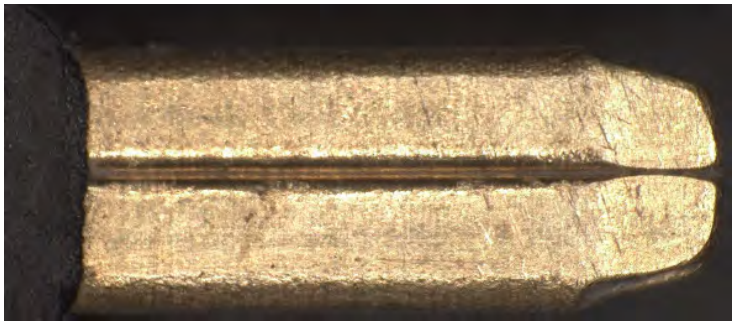
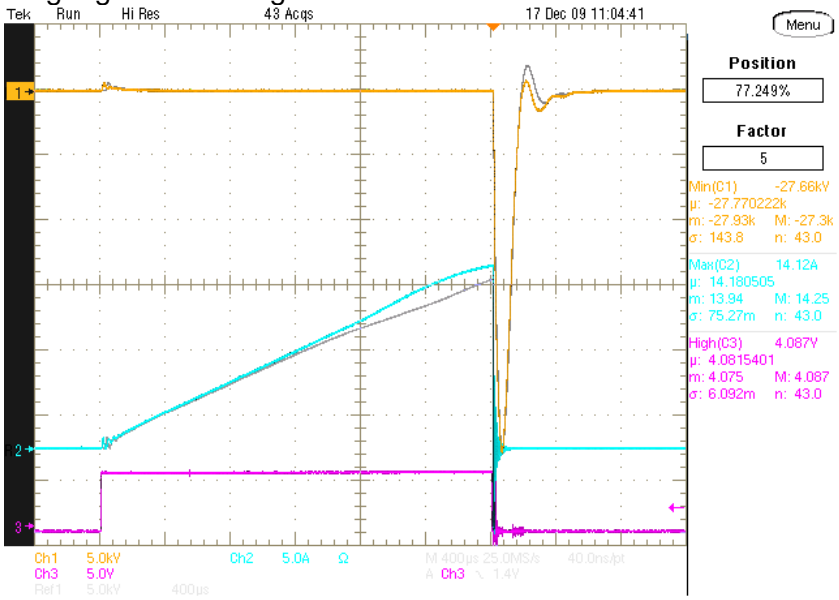


Abbildung 6: Spule -4, Pin4, Messing unbehandelt

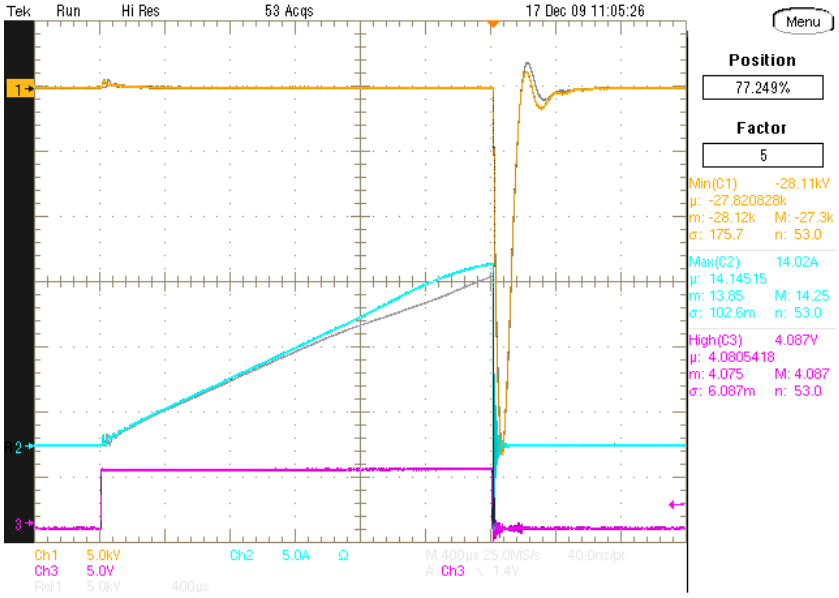
- **Elektrische Vermessung**

Eingangsvermessung:



Graue Linien sind die Referenzverläufe einer Originalspule

Abbildung 7: Spule -1, elektrische Vermessung bei RT



Graue Linien sind die Referenzverläufe einer Originalspule

Abbildung 8: Spule -2, elektrische Vermessung bei RT

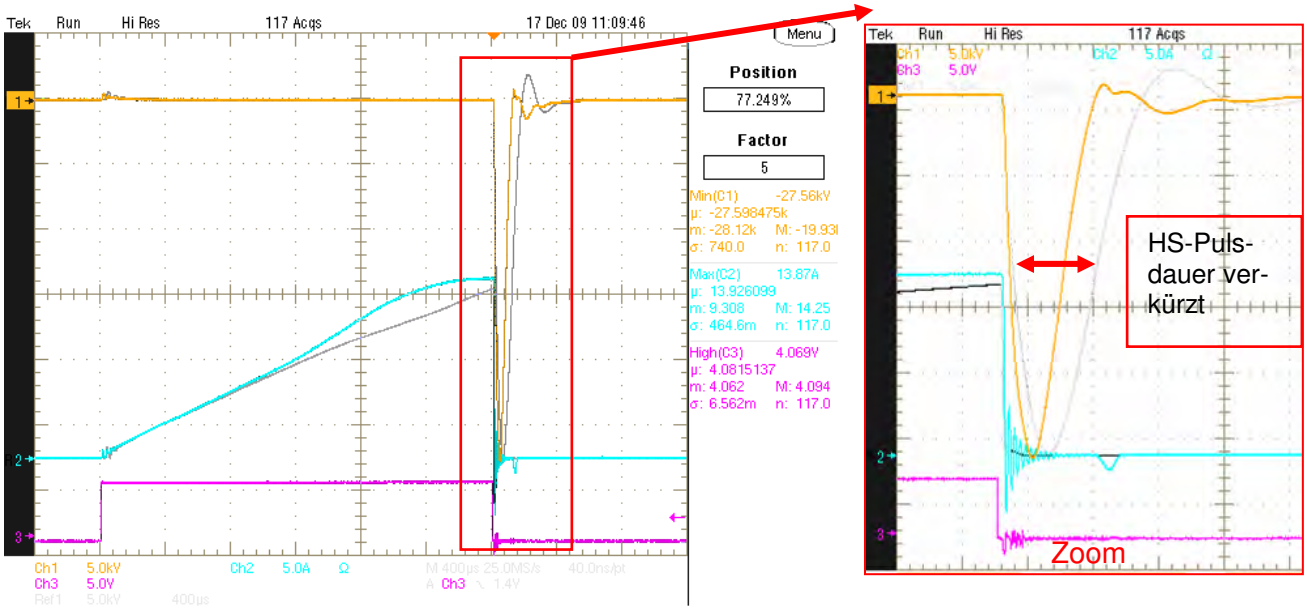


Abbildung 9: Spule -3, elektrische Vermessung bei RT

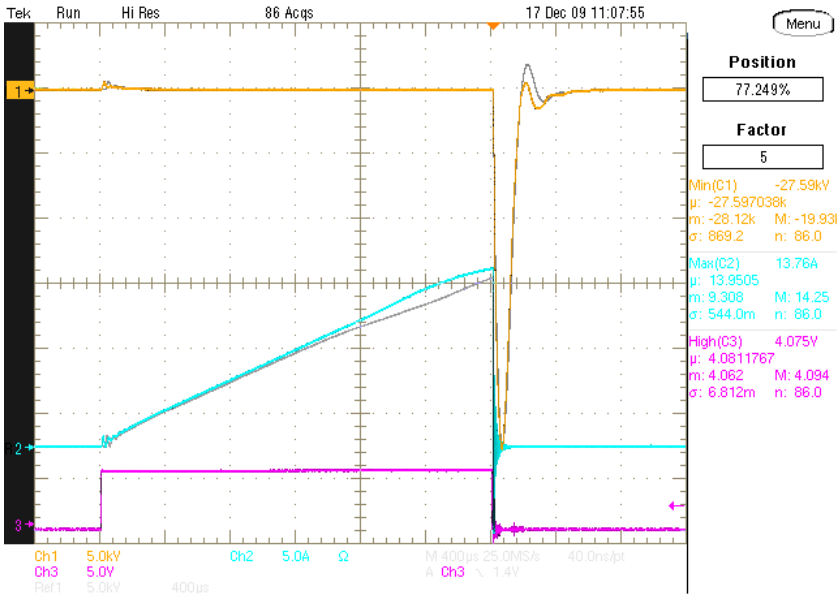


Abbildung 10: Spule -4

Spule -1; -2: bei 140℃ Betrieb i.O
Spule -1; -2: bei -30℃ Betrieb i.O

Eine Stillstandsabschaltung ist bei allen vier Teilen gegeben: nach 50ms Ansteuerung gingen die Spulen in die „shut-down“ Abschaltung.

- **Radioskopie**

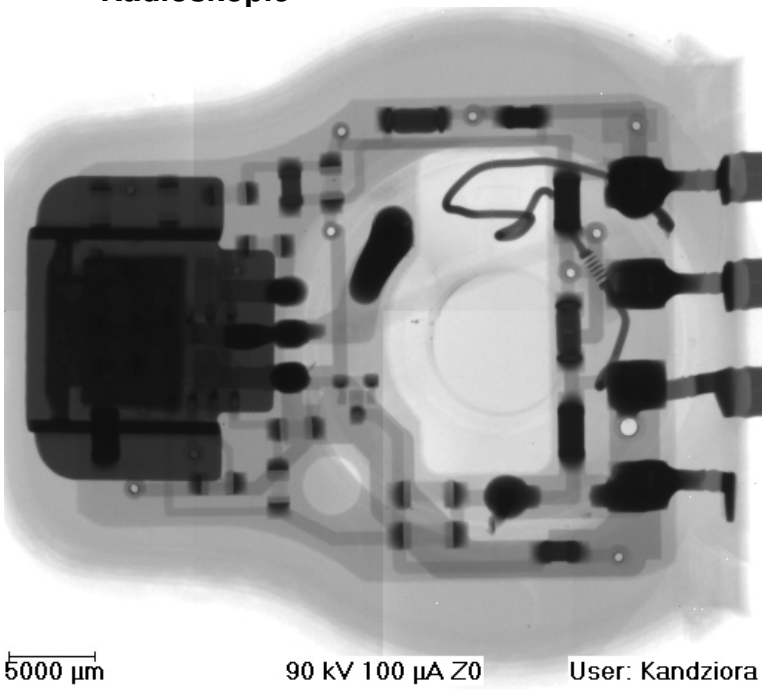


Abbildung 11: Spule -4, Platine

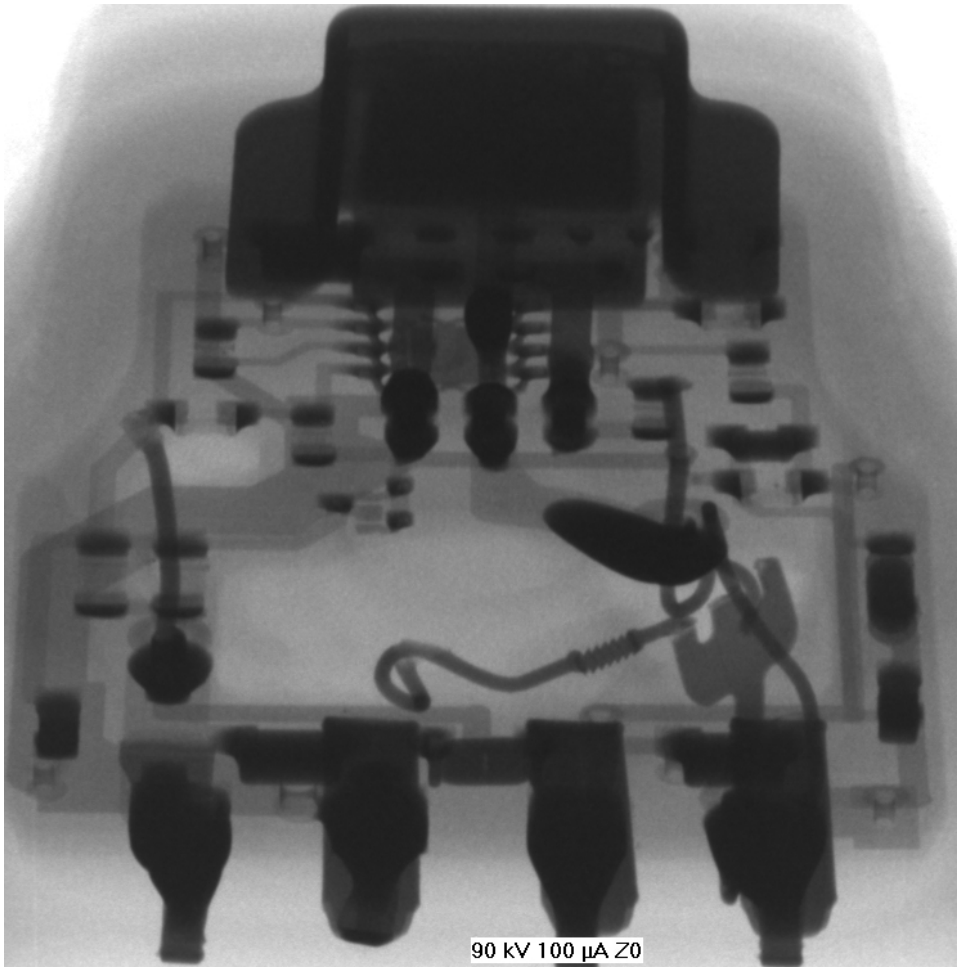


Abbildung 12: Spule -4, Platine, schräge Durchstrahlung: Metalldeckel über dem IGBT

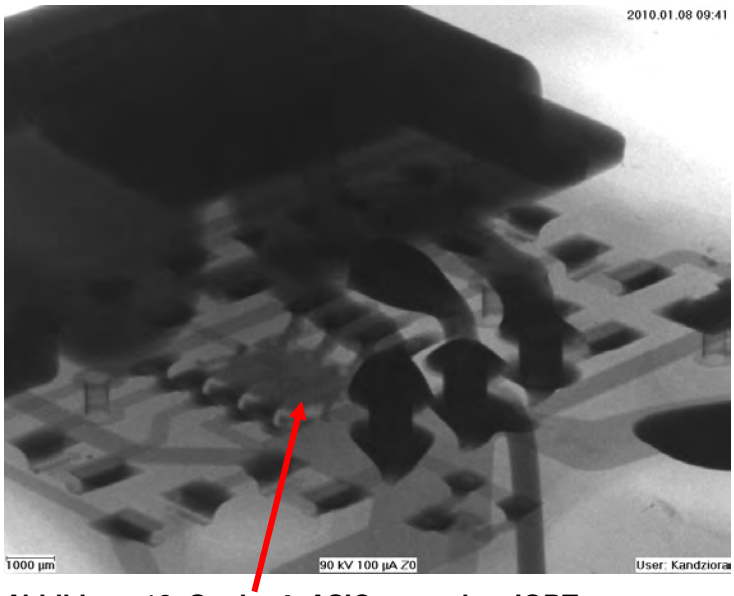


Abbildung 13: Spule -4, ASIC unter dem IGBT

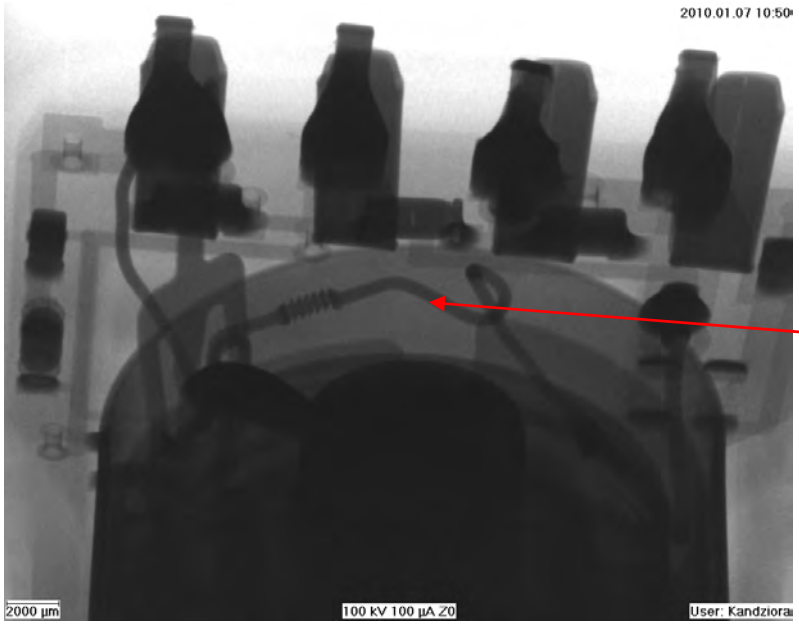
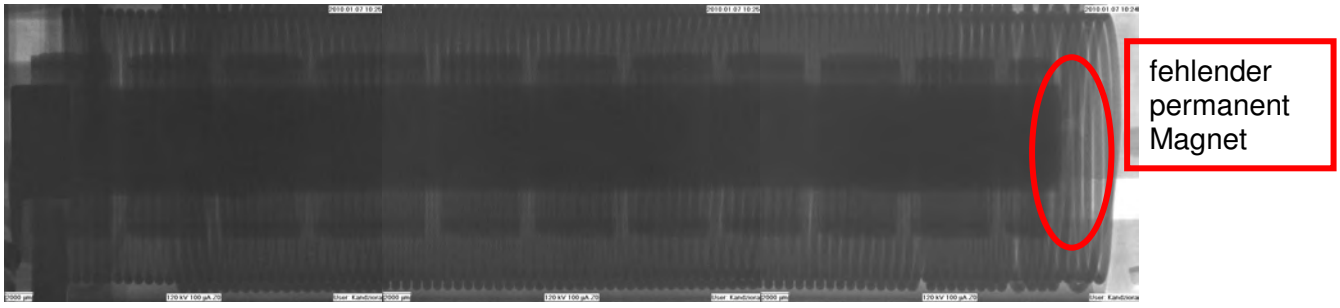
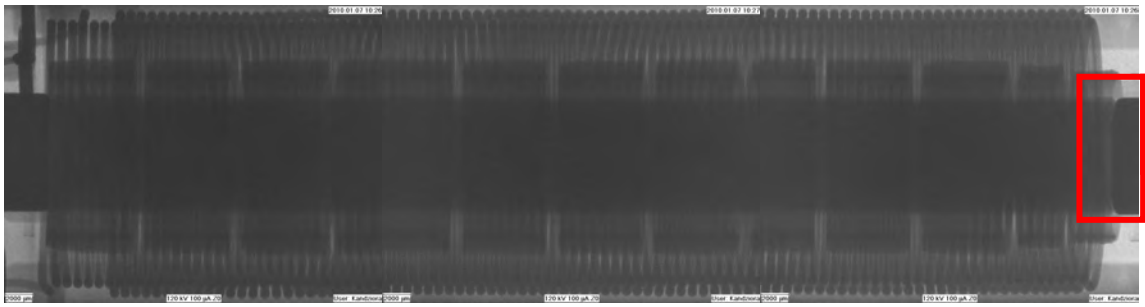


Abbildung 14: Spule -4, Platine Steckerseite



0V **HV**

Abbildung 15: Spule -3, Spulensystem, kein Magnet auf der HV-Seite



0V **HV**

Abbildung 16: Spule -4, Spulensystem

4 Durchführung

Die Ergebnisse dieser Untersuchungen wurden unter der Mitwirkung von IAV - Mitarbeitern erzeugt. Die Röntgendurchstrahlungsuntersuchung wurde an der Phönix Nanomex 160NF durchgeführt. Die Einzelergebnisse und Maschinenparameter können bei GQL-LM/5 eingesehen werden. Die Spulen stehen bei GQL-LM/5 für weitere Analysen zur Verfügung.

Reverse engineered ignition coils in the USA market

	Draft		Interim report no.	x	Final report	Number of interim reports:

Part number	Designation	Drawing date	Supplier	Score -
.06B.905.115.N	Ignition coil			

1 Task

The first reverse engineered ignition coils have turned up on the USA market that look confusingly similar to VW genuine parts; except that certain important details are missing, such as the part number, for example. As part of this LIMS task, these reverse engineered parts are to be compared with original VW parts.

2 Summary

The parts are visually indifferent from the VW FSI coils: 06B 905 115. In parts -1;-2:-4 the coil and power supply were similar to the original parts (slightly increased current propagation with comparable secondary voltage). Only in part -3 does the secondary voltage strongly differentiate from the original course, probably because of a missing permanent magnet on the HV side.

3 Individual results

- **Visual inspection**

Laser marking on the plug dome:
Coil-1 081101AK
Coil-2 081101AK
Coil-3 no label on the coil head
Coil-4 081101AK

Image 1: coil packaging

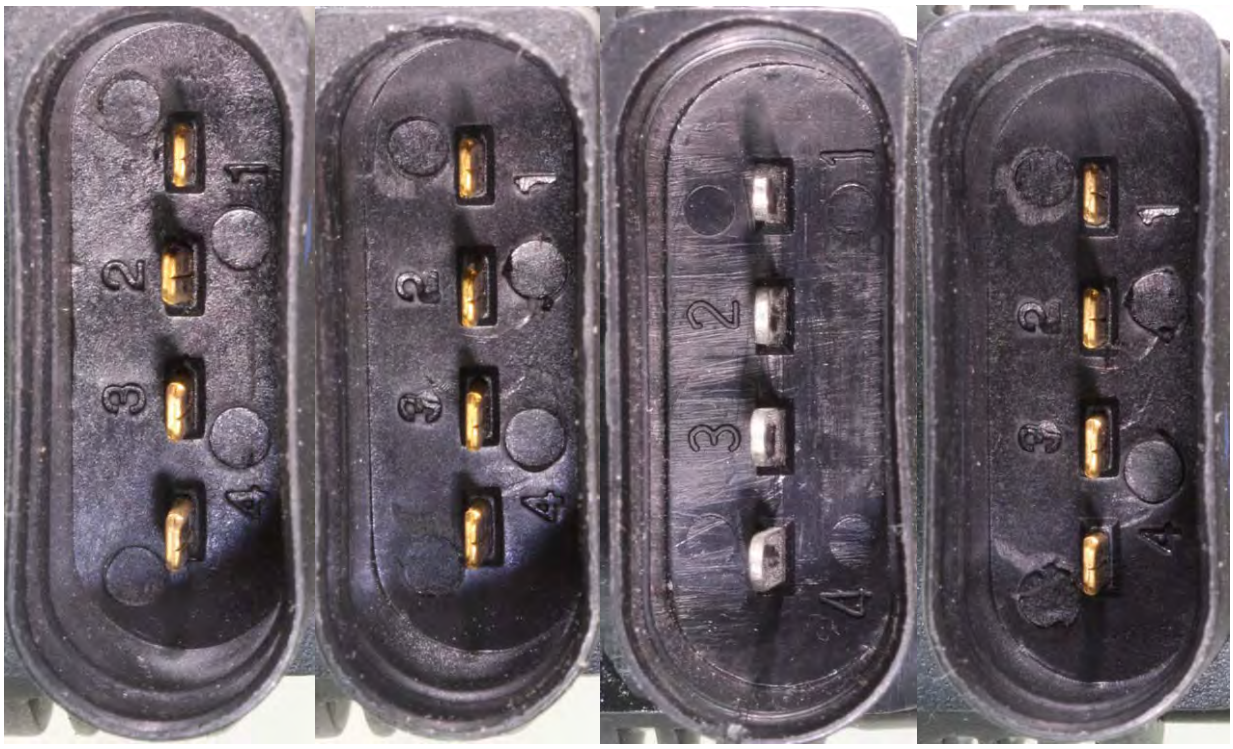
All four coils were individually packaged in the packaging shown in Fig. 1.

Image file:

Image 2:coil head overview

Image 3: coil overview, mark: varying position of the return plate

Image 4: coil -3 gap on the return plate moved by 130°



-1	-2	-3	-4
Contacts on brass	brass	tin-plated	brass

Image 5: plug

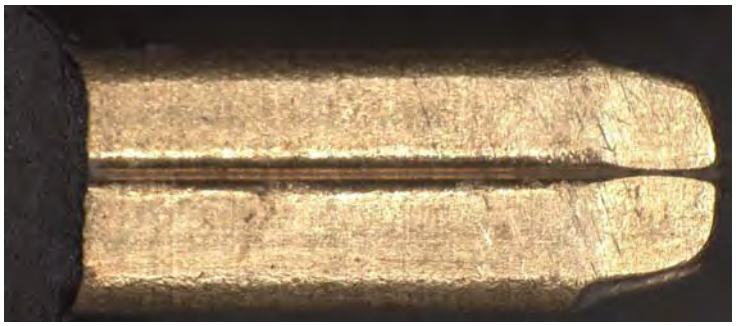
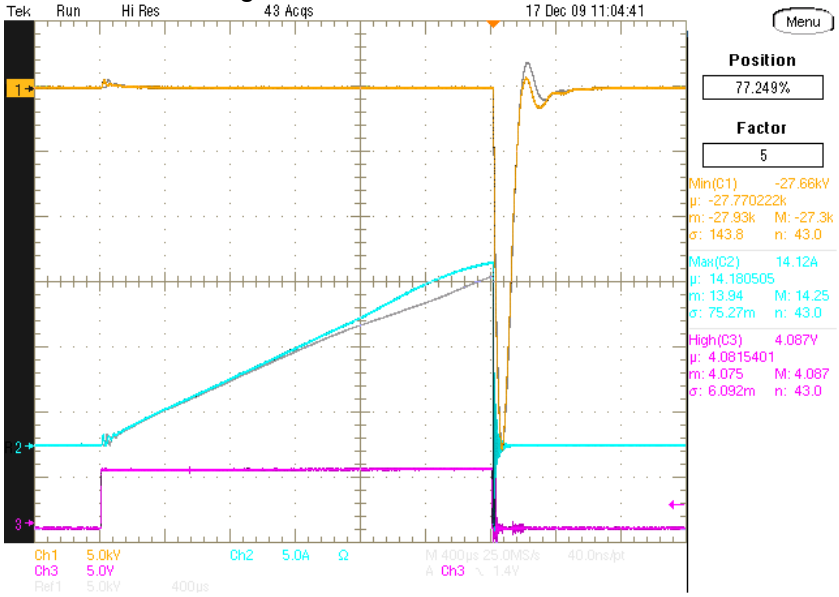


Image 6: Coil -4, Pin4, brass untreated

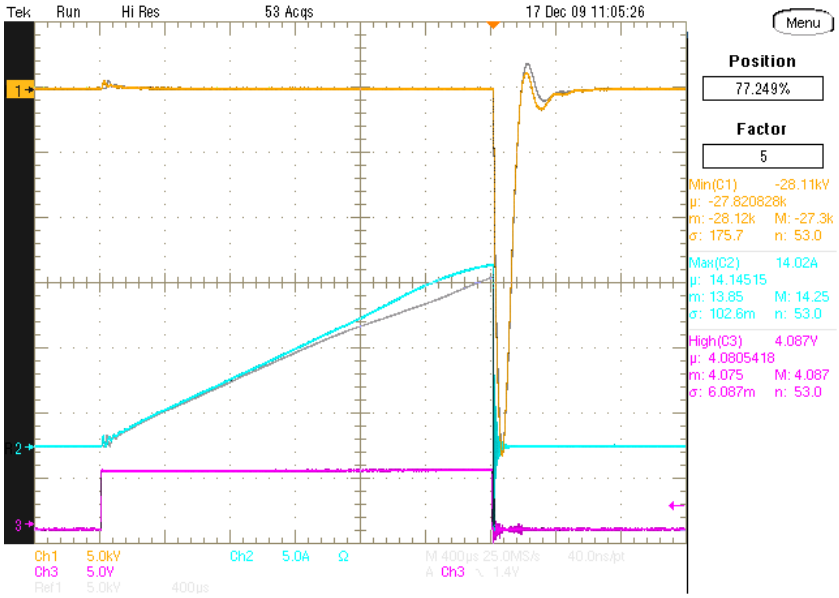
- **Electrical alignment**

Inbound measuring:



Grey lines are the reference courses of an original coil

Image 7: coil -1, electrical alignment in RT



Grey lines are the reference courses of an original coil

Image 8: coil -2, electrical alignment in RT

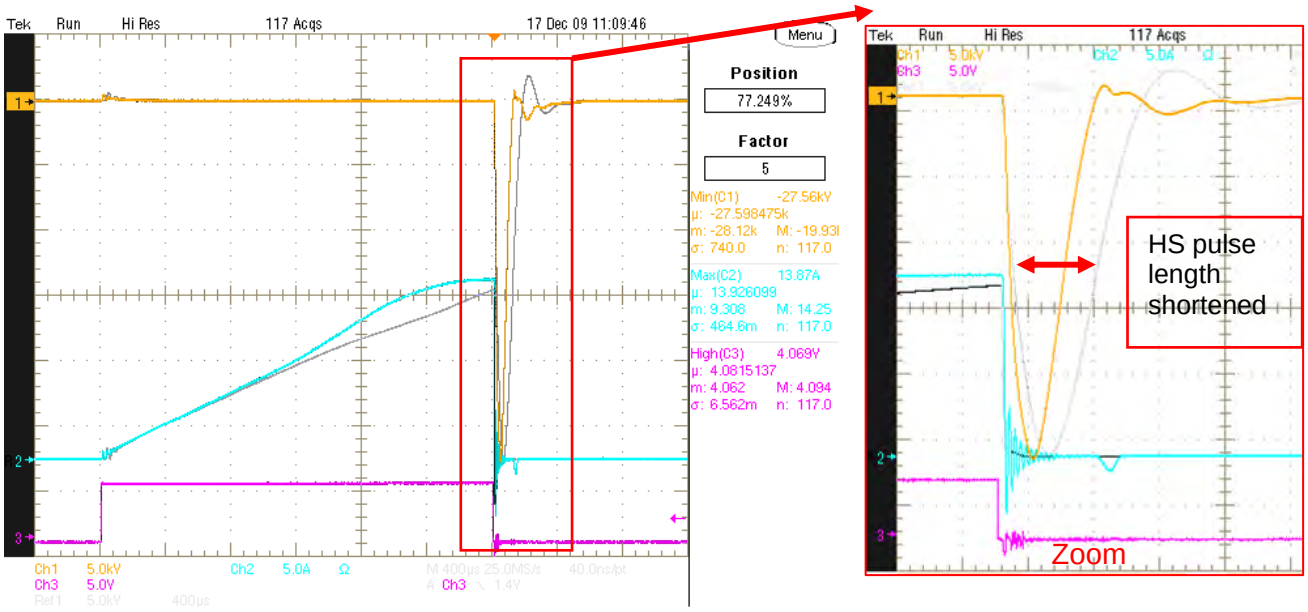


Image 9: coil -3, electrical alignment in RT

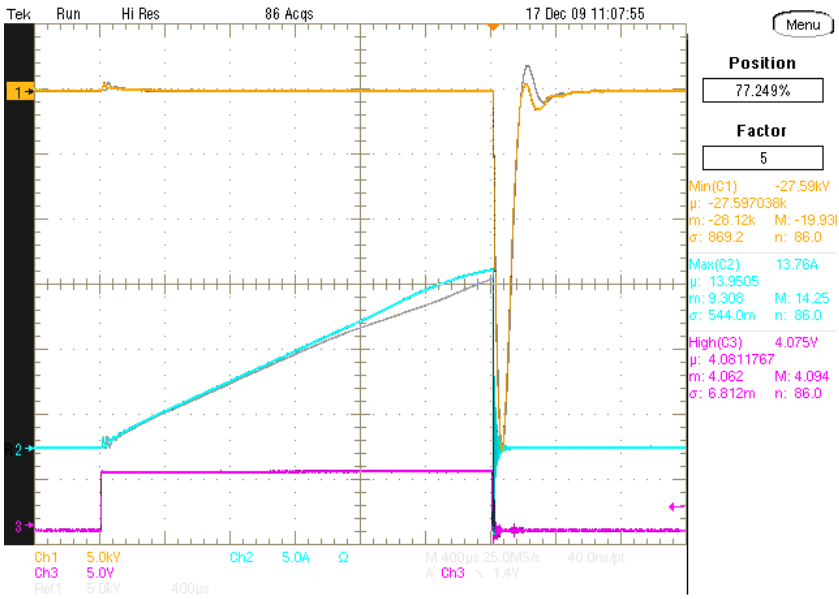


Image 10: Coil-4

Coil -1; -2: at 140°C operation OK
Coil -1; -2: at -30 operation OK

There was a safety switch-off with all four parts: after 50ms control the controls went into 'shut down' cut-off.

- **Radioscopy**

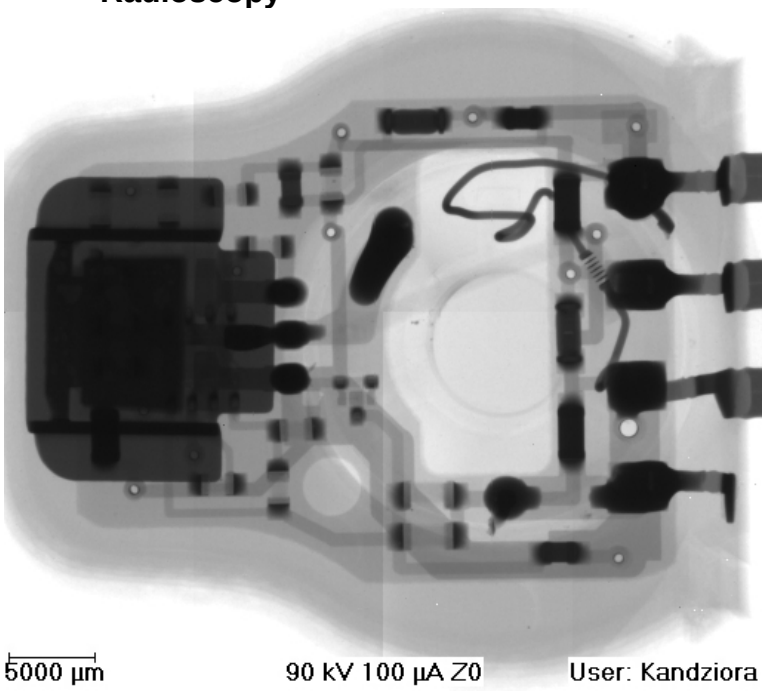


Image 11: coil -4, printed circuit

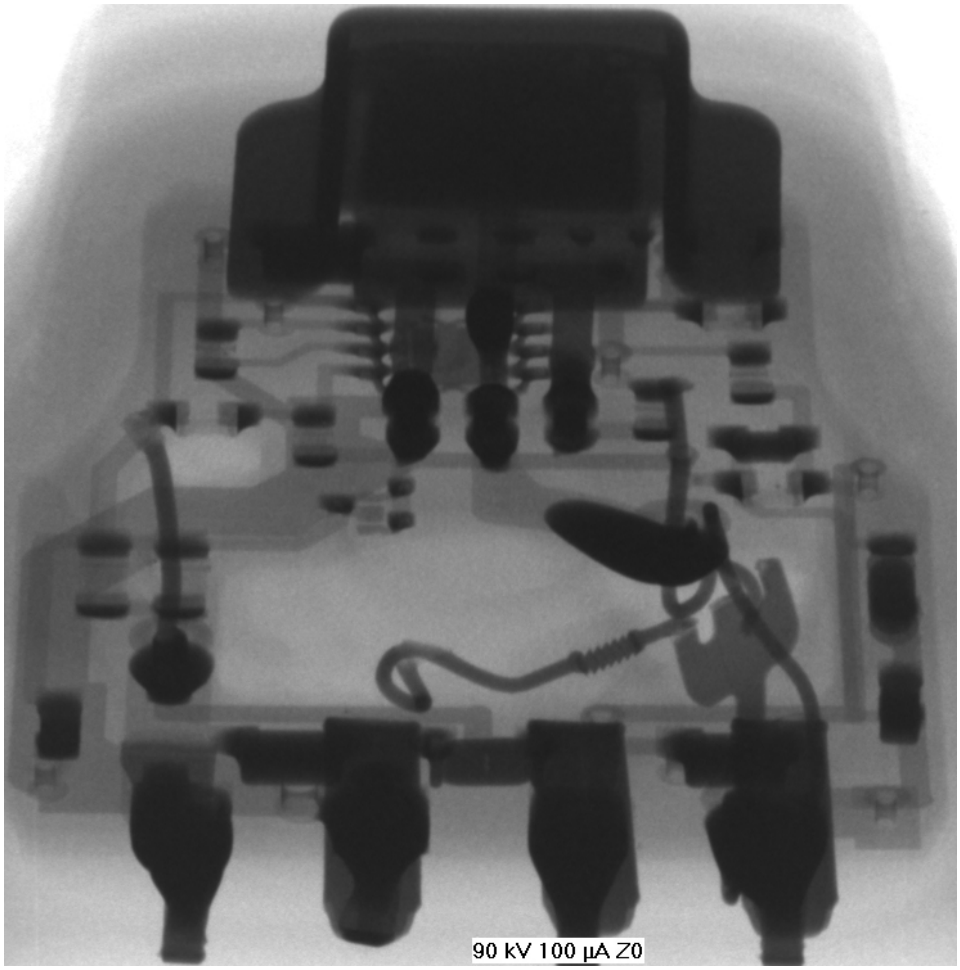


Image 12: coil -4, printed circuit, diagonal radiography: metal lid over the IGBT

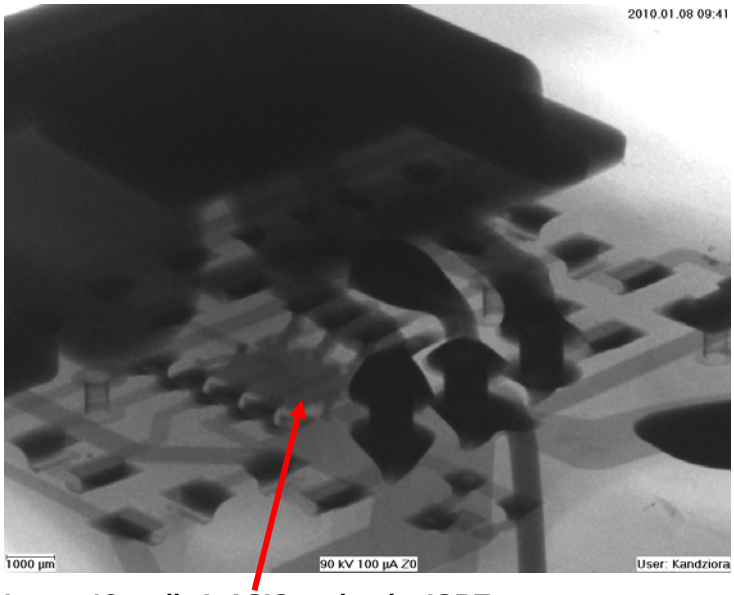


Image 13: coil -4, ASIC under the IGBT

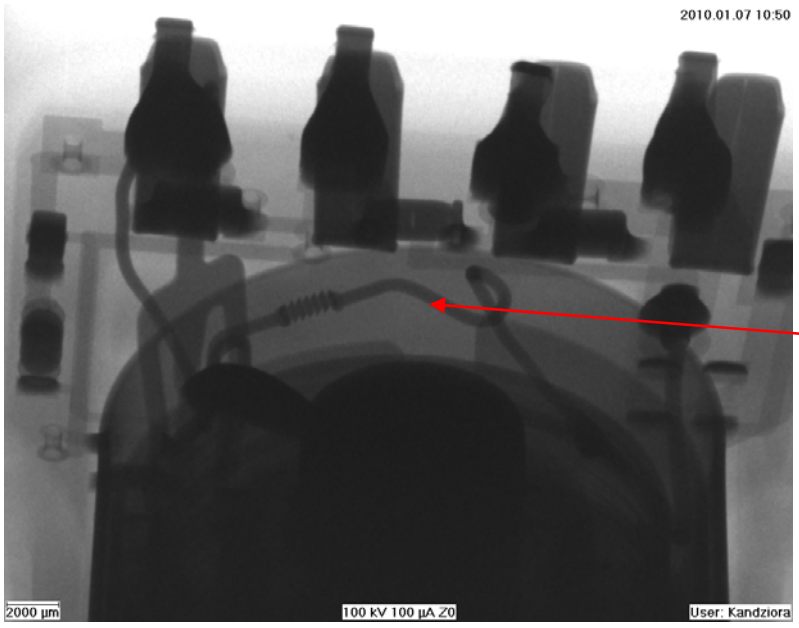
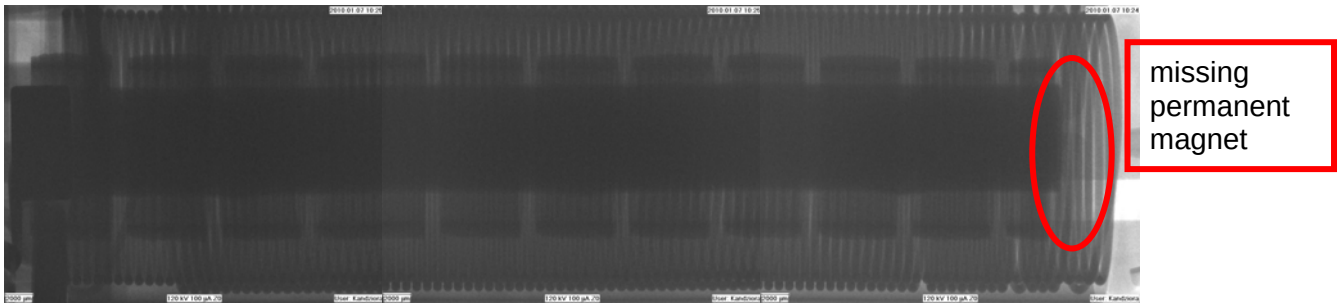
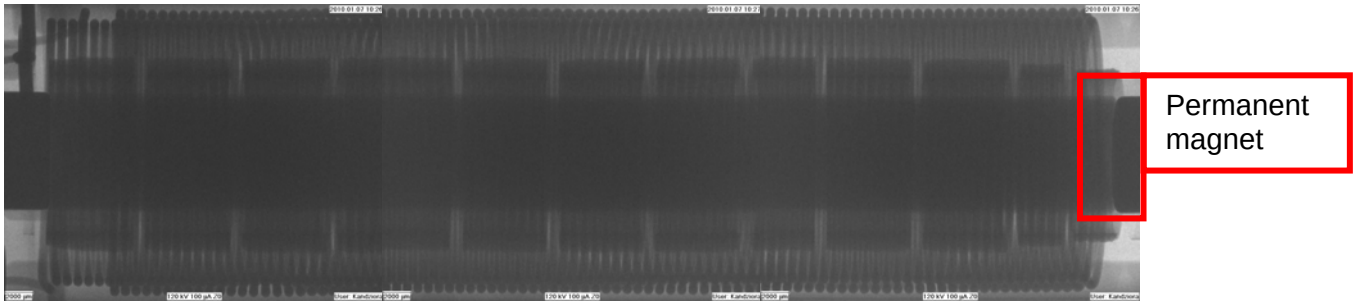


Image 14: coil -4, plug side printed circuit



0V **HV**

Image 15: coil -3, coil system, no magnet on the HV side



0V **HV**

Image 16: coil -4, coil system

4 Processing

The results of these investigations were carried out with the help of IAV employees. The x-ray investigation was carried out on the Phoenix Nanomex 160NF. The individual results and machine parameters can be viewed in GQL-LM/5. The coils are available for further analyses at GQL-LM/5.