

PE16-018

HYUNDAI

3-23-2017

LETTER TO ODI

Response to Request 8

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Vehicle Inspections

Action List

Title	Document	Start Date	End Date	Objective	Responsible Group	Summary
Technical Committee Review	Field Action Proposal.pdf	2/27/2017	2/27/2017	Gain consensus for field action in the U.S.	HMA Service	Based on the field market condition, Hyundai proposes to conduct a recall in the U.S. for the subject condition.
Vehicle Inspections	Photos in directories: Vehicle Inspection/5NPEC4AC0DH731226 Vehicle Inspection/KMHEC4A49DA081078	9/29/2016	9/29/2016	Inspect vehicle condition and summarize.	HMA Engineering & Design Analysis	Passenger seatbelt was found detached from the anchor pretensioner. Witness marks (scratches) indicated the lock/unlock mechanism had been tampered with. Seatbelt webbing and latch plate loading marks indicated the seatbelt restrained an occupant during a crash. The passenger seatbelt was recovered (10/12/2016) and sent to the supplier for analysis.
		12/22/2016	12/22/2016			Passenger seatbelt was found detached from the anchor pretensioner. There were no witness marks(scratches) on the lock/unlock mechanism. There were no loading marks on the seatbelt webbing. The seatbelt was recovered by the supplier representative.
Supplier Analysis	-	12/2010	12/2010	Initiate Design Review	Supplier	ZF TRW initiates design study on latch assemblies.
	2016.11.21 ZF TRW Presentation.pdf	11/21/2016	11/21/2016	Provide OEM with results of recovery part analysis.		Please see the attachment for supplier-based conclusion.
	2017.01.16 ZF TRW Presentation.pdf	1/16/2017	1/16/2017	Provide OEM with results of design & manufacturing investigation.		Please see the attachment for supplier-based conclusion.
	6DDF69DE.pdf (embedded file in 2017.01.16 ZF TRW Presentation.pdf)	1/16/2017	1/16/2017	Provide supplier manufacturing process change history.		Please see the attachment for details.
	2017.02.02 ZF TRW Presentation.pdf	2/2/2017	2/2/2017	Provide OEM with results of design & manufacturing investigation.		Please see the attachment for supplier-based conclusion.
OEM Analysis	Meeting Follow-up Summary.pdf	1/27/2017	2/2/2017	Request investigation status from supplier.	HMC Chassis Engineering Design Improvement	Please see the attachment for details.
Replication Testing	Testing results [ENG].pdf	1/5/2017	1/13/2017	Replicate the phenomenon.		The alleged condition is potentially caused by an intermittent occurrence of the linkage latch becoming caught in the connector slot, which can potentially cause a half-lock condition.
	Testing results [KOR].pdf (Korean language original)					
	Pretensioner Connection To Seatbelt (Videos).pdf	1/4/2017	1/4/2017	Illustrate the conditions of the pretensioner connection and lock.	HMMA QA Improvement 1	The condition can be replicated by varying the positions of the lock nut on the anchor.
	Video files in directory "Videos"					

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Technical Committee Review

Field Action Proposal

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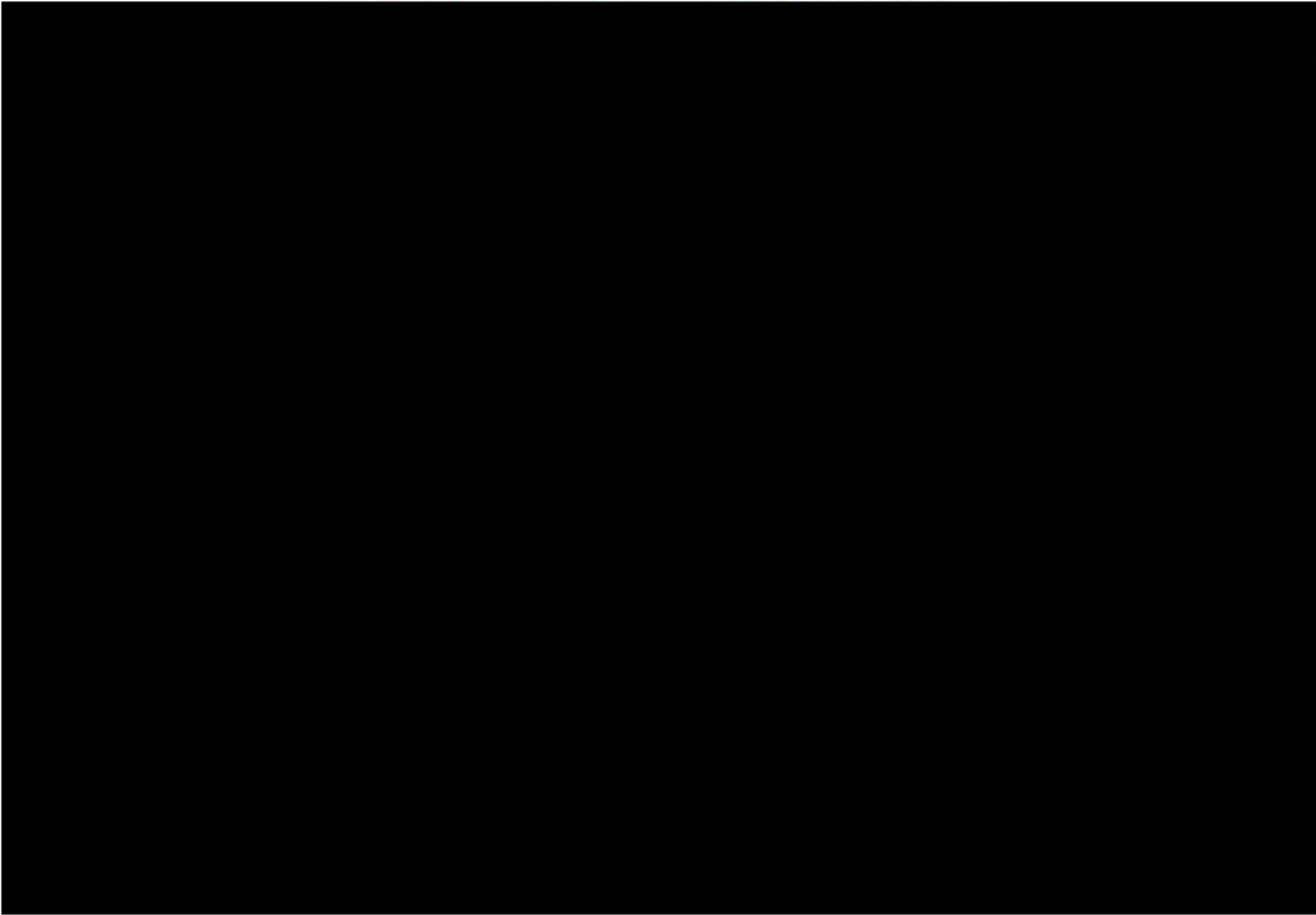
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Meeting Follow-up Summary





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Replication Testing

Pretensioner Connection To
Seatbelt (Videos)

▣ YFa Pretensioner Investigation

► YFa Pretensioner Assembly Videos



Sample #1	
VIN	000183
Prod	`09.11/16

Sample #2	
VIN	288732
Prod	`11.4/27

Sample #3	
VIN	398056
Prod	`11.10/17

Sample #4	
VIN	705244
Prod	`13.3/6

Summary

© Sample #1/4 did not have a partial latching issue
└ After the first distinctive “click” latch was fully engaged

© Sample #2/3 had two separate “Clicks” first “click” only half engages the latch and was able to detach the seatbelt with a jerking pull force applied on it

© After evaluating the production period and different conditions it does indicate that there may be a variation between the parts

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Replication Testing

Testing Results [ENG]

Re-creation result and assumed cause

- Upon fastening a linkage into a cable connector, half-lock fastening is re-created (14MY YFa LH/RH all re-created)

- Re-creation condition

- 1) Upon fastening a linkage to a connector interior side direction in the rear of standard driver's seat, upon attempting over 50 times, there is an intermittent occurrence (Influence due to internal deformation also needs verification)

- Assumed cause

- 1) In case a cable connector inclines and inserted, before cable connector initially raises locker for complete insertion, latch rotation assumed.

✂ Under the condition of taking cover off, due to a part gap, re-creation is difficult and accurate condition verification is not possible

- According to locker gap-cable connector matching part assumes housing inner side transfer

(Transparent cover manufacture or TRW analysis needed)

- 2) Old part's wear trace matches the part in which latch is interlocking in a half-lock condition.

- From a half-lock condition, linkage displacement re-created during usage

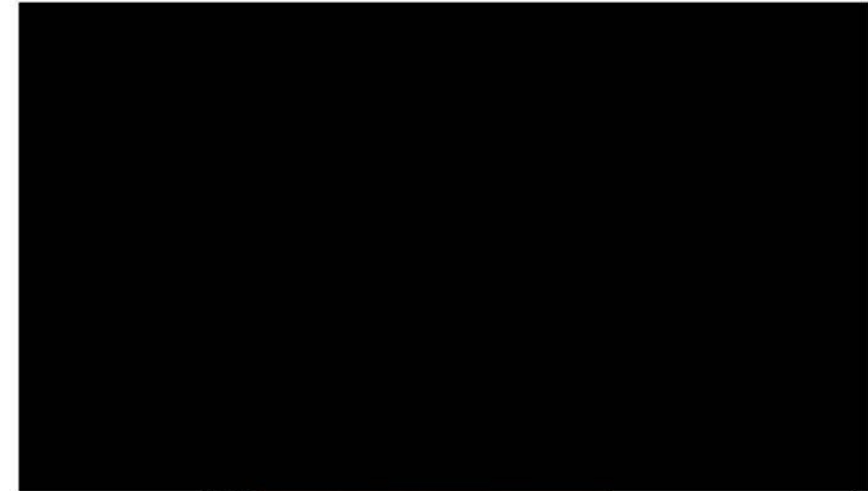
- According to a half-lock condition, upon exerting load and vibration, final tightening entry or displacement occurs
- Even in a half-lock condition, although a sufficient restraint capability is maintained to the extent that there won't be any displacement during general usage, it is assumed that a displacement is possible upon anchor PT operation

- Comprehensive opinion

- Upon half-lock occurrence in assembly and repair process, customer complaint phenomenon occurrence is possible
- However upon forward direction entry, after cable connector's complete insertion, latch rotates and hence it is determined that there would be no occurrence possibility
- From a condition of un-mounted seat, forward direction-fastening inline occurrence possibility is low and under the seat mounting condition, occurrence possibility is assumed to be higher upon repair

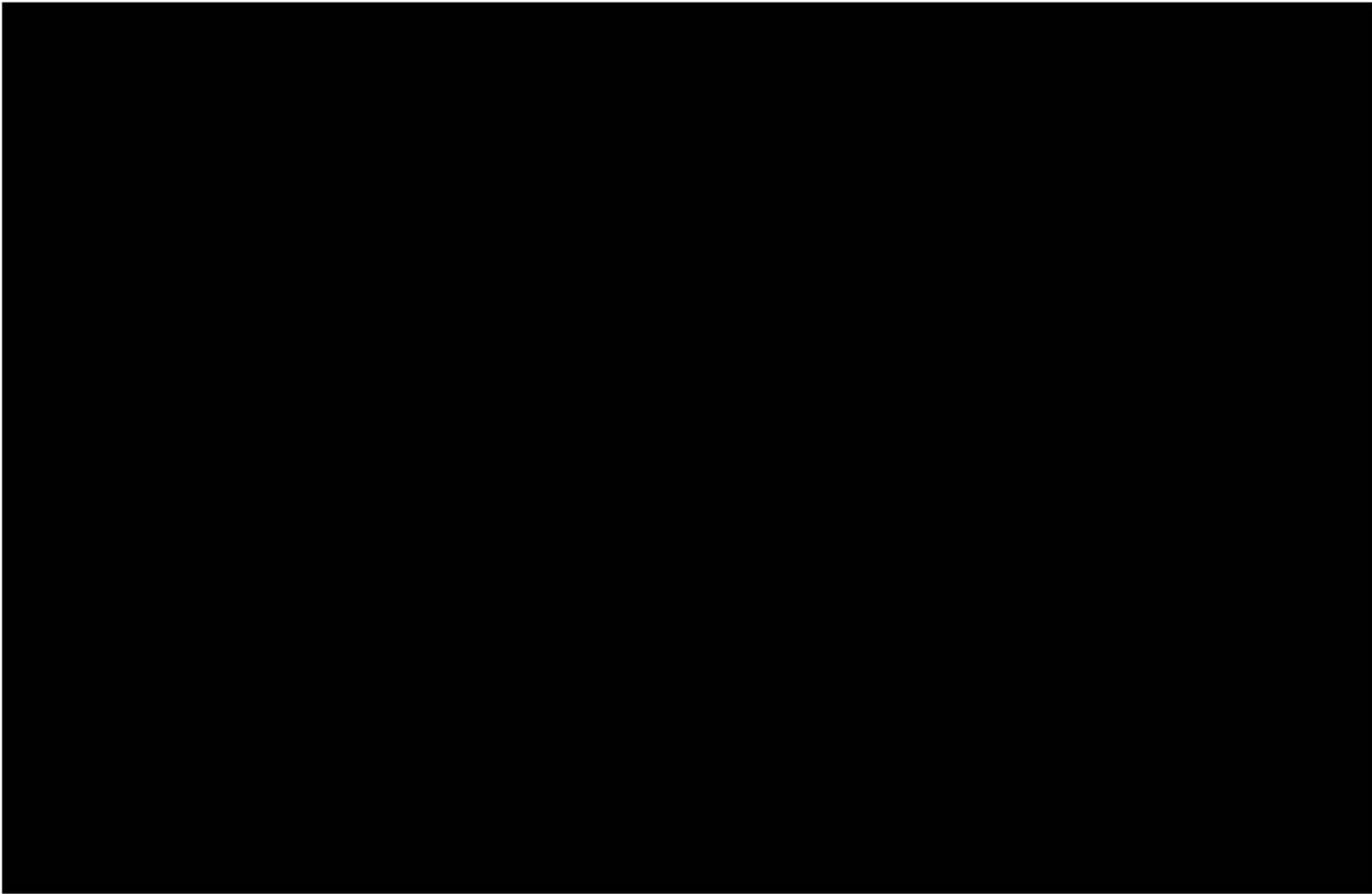
(Via warranty/warranty completion/inside company repair history, parts exchange history verification needed)

✂ Upon repair due to accident, there is no warranty record



Witness Mark of Coating Removal indicates Linkage Latch traveled in Connector Slot

Latch settled part upon half-lock



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Replication Testing

Testing Results [KOR]

재현결과 및 추정 원인

- 링키지를 케이블 커넥터에 체결시 하프락 체결 재현됨 (14MY YFa LH/RH 모두 재현됨)

재현조건

- 1) 운전석 기준 후방, 실내측방향에서 링키지를 케이블 커넥터에 체결시
- 2) 50회 이상 시도시 간헐적 발생 (내부 변형에 의한 영향도 확인 필요)

추정원인

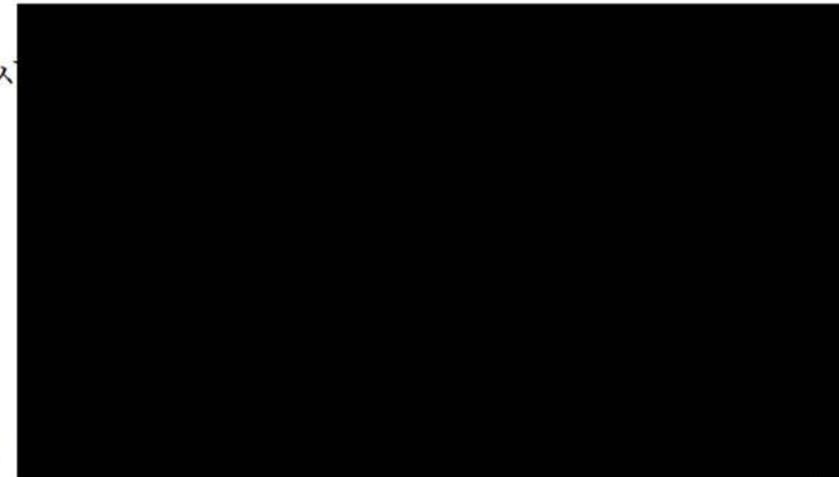
- 1) 케이블 커넥터가 기울어져 삽입될 경우, 케이블 커넥터가 록커를 조기에 들어올려 완전 삽입전 래치 회전 추정
 ※ 커버를 벗긴 상태에선, 부품 유격 때문에 재현 어려워 정확한 상태 확인 불가
 - 록커 유격에 따른 케이블 커넥터 매칭부가 하우징 내측 이동 추정
 (투명 커버 제작 또는 TRW 분석 필요)
- 2) 고품의 마모 흔적은 하프락 상태에서 래치가 물리는 부분과 일치함

- 하프락 상태에서, 사용중 링키지 이탈 재현됨

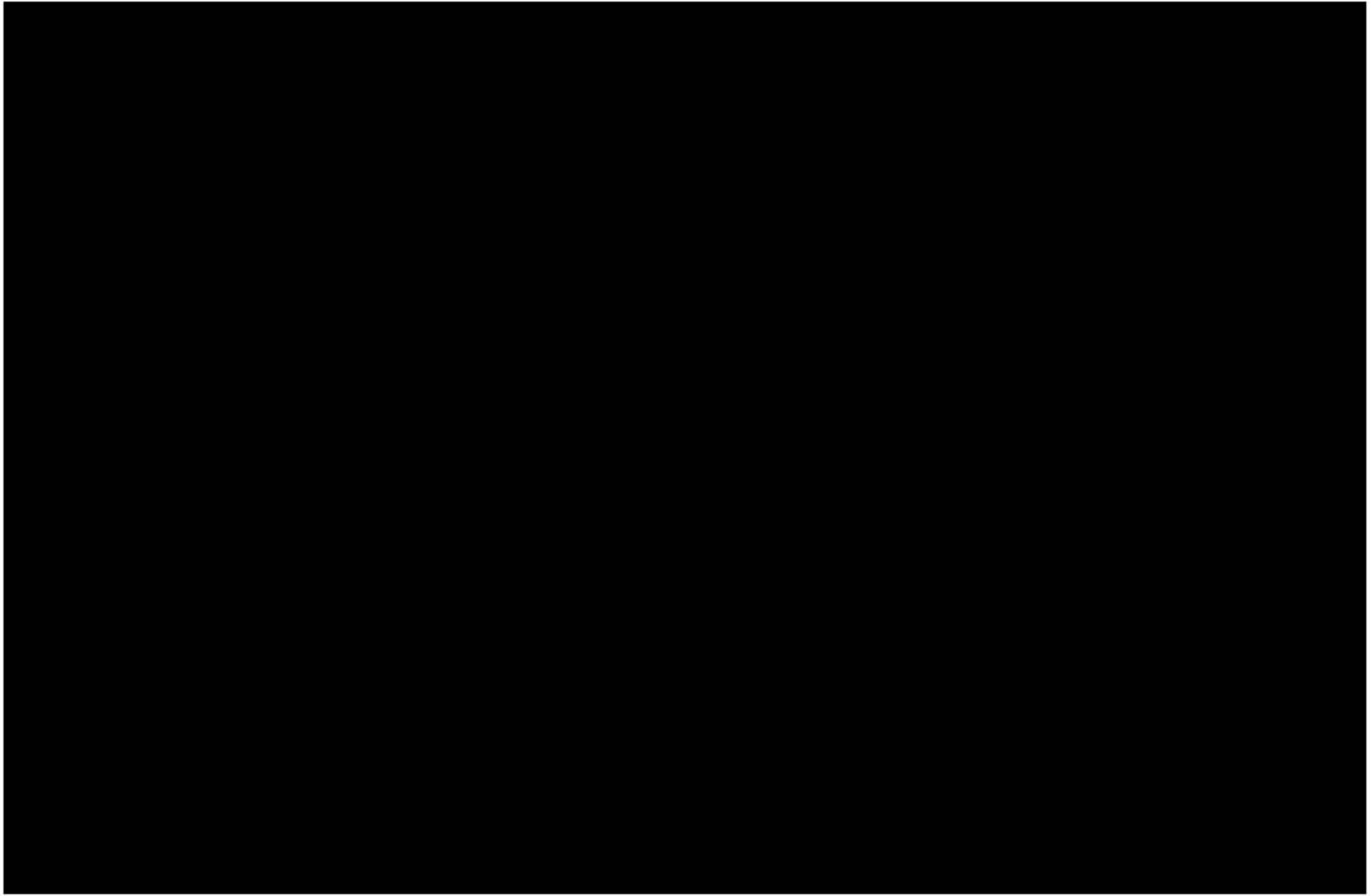
- 하프락 상태에 따라 하중 및 진동을 가할시, 정체결로 진입 또는 이탈 발생
- 하프락 상태에서도 일상 사용중 이탈하지 않을 정도의 충분한 구속력을 유지하나, 앵커_{PT} 작동시에는 이탈 가능할 것으로 추정됨

- 종합 의견

- 조립 및 수리과정에서 하프락 발생시 고객불만 현상 발생 가능성 있음
- 단, 정방향 진입시에는 케이블 커넥터가 완전 삽입후 래치가 회전되어 발생가능성 없을 것으로 판단
- 시트 미장착 상태에서 정방향으로 체결하는 인라인 발생가능성은 낮으며, 시트 장착상태에서 수리시 발생 가능성이 더 높을 것으로 추정됨
 (워런티/워런티만료/사내 수리이력, 사고에 의한 부품 교환 이력 확인 필요)
 ※ 사고로 인한 수리시에는 워런티 기록 없음



하프락시 래치 안착부



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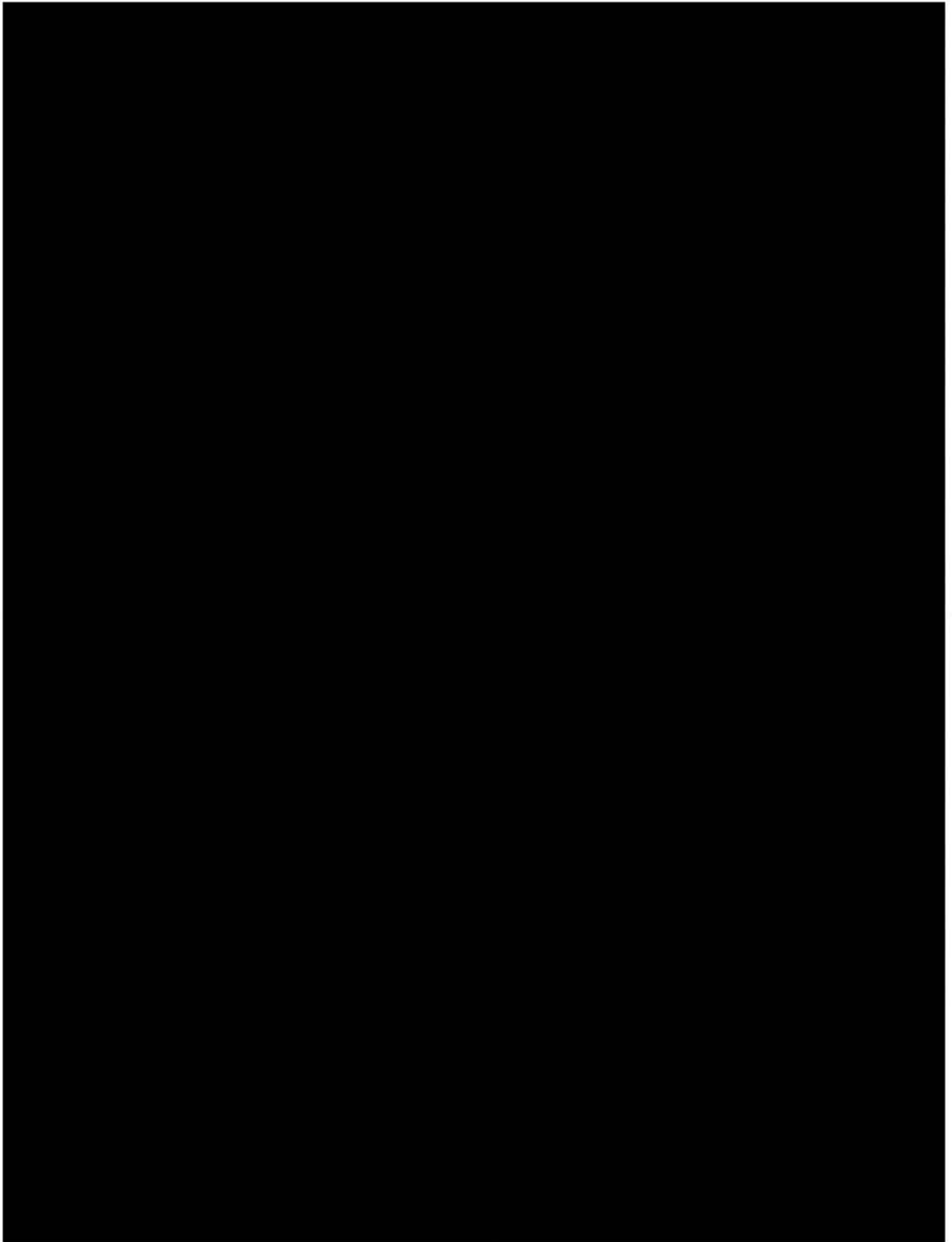
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Supplier Analysis

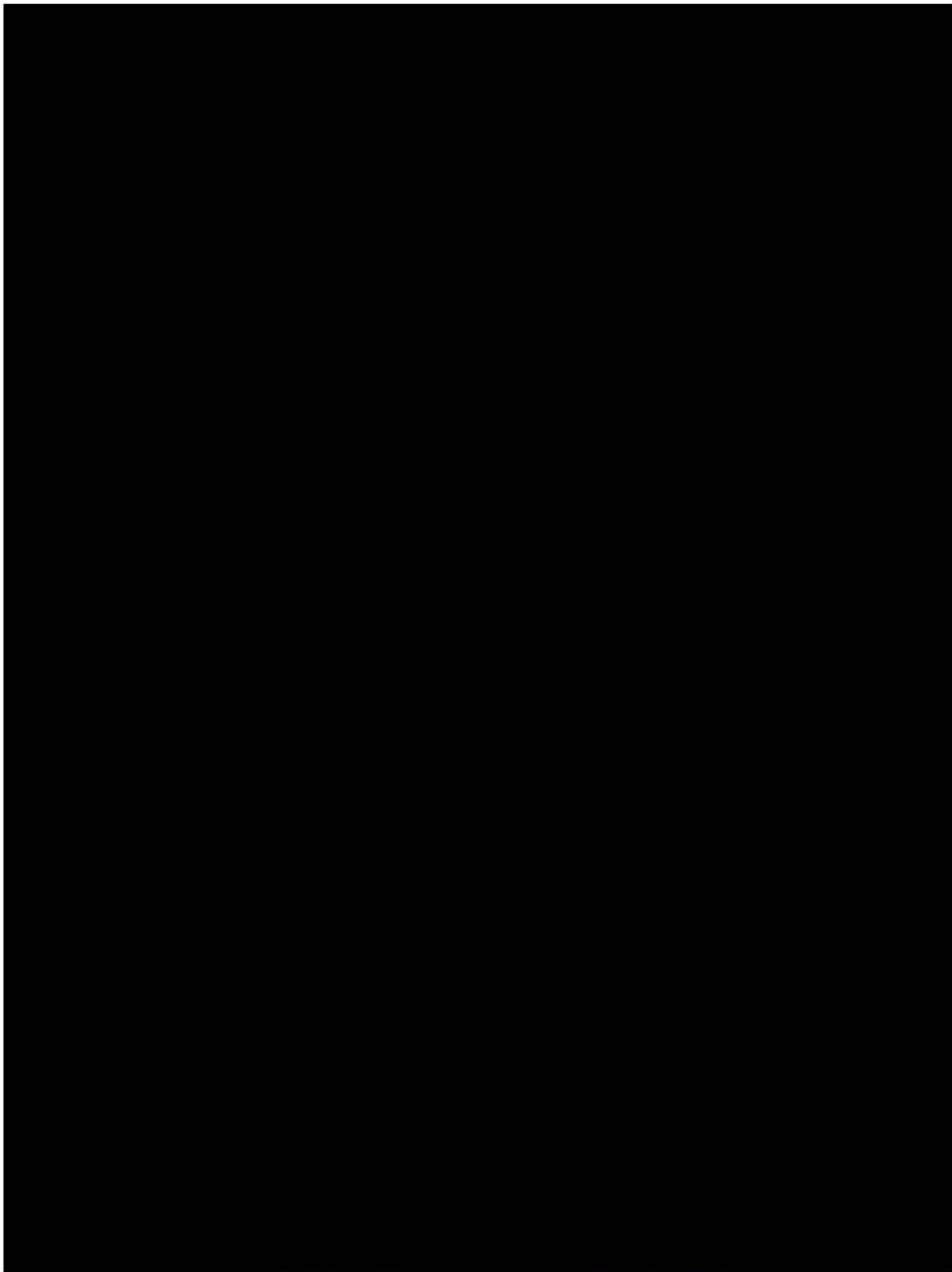
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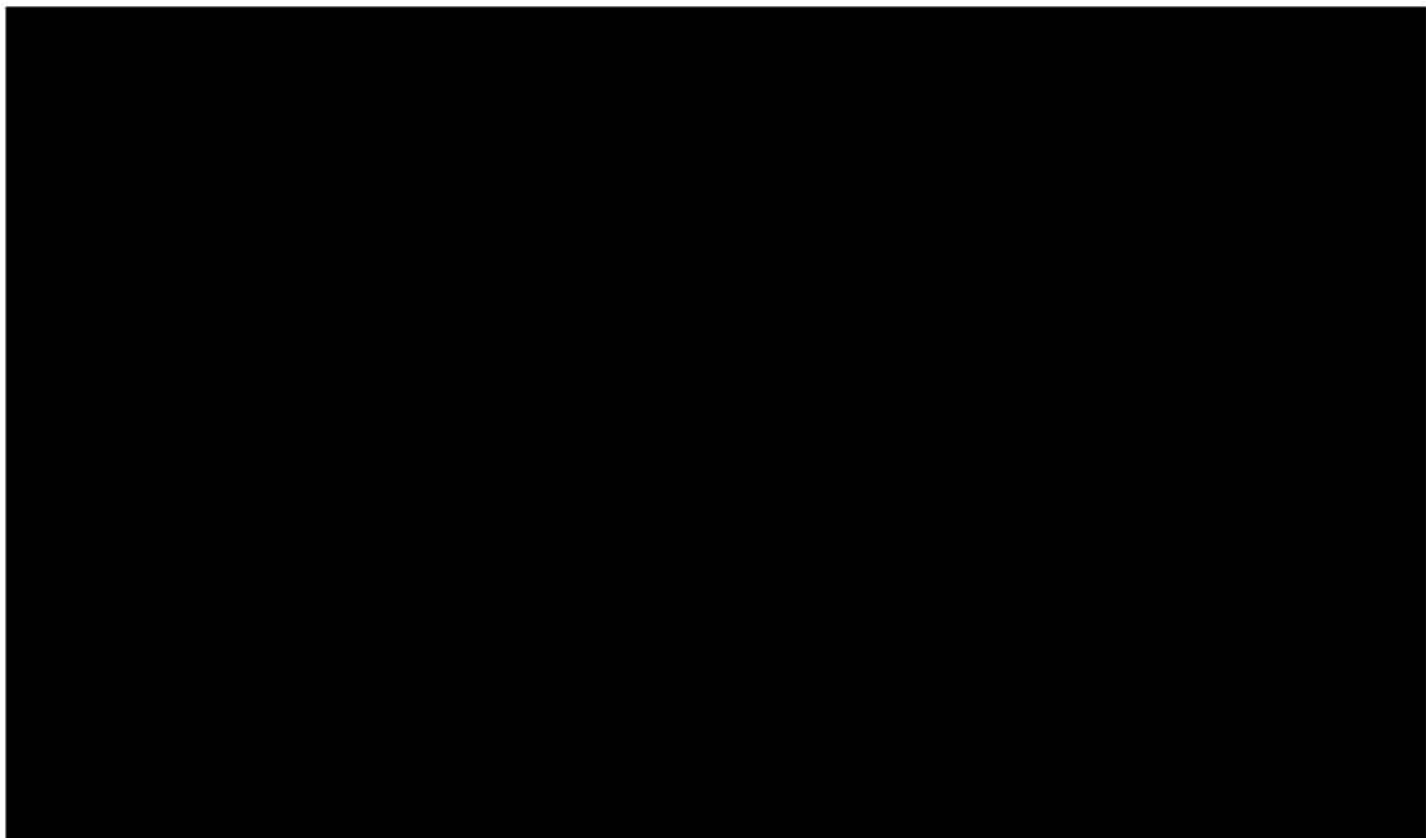
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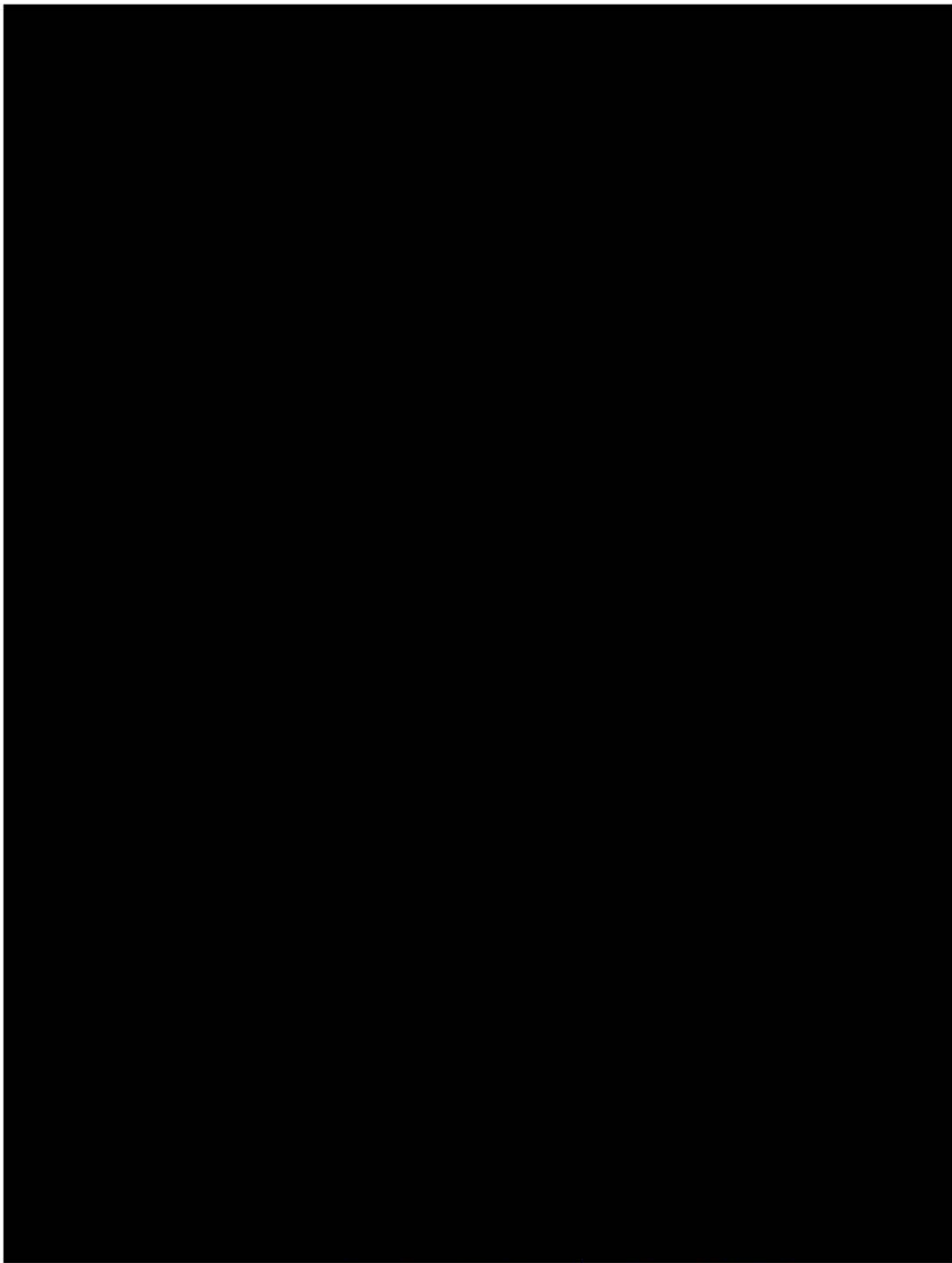


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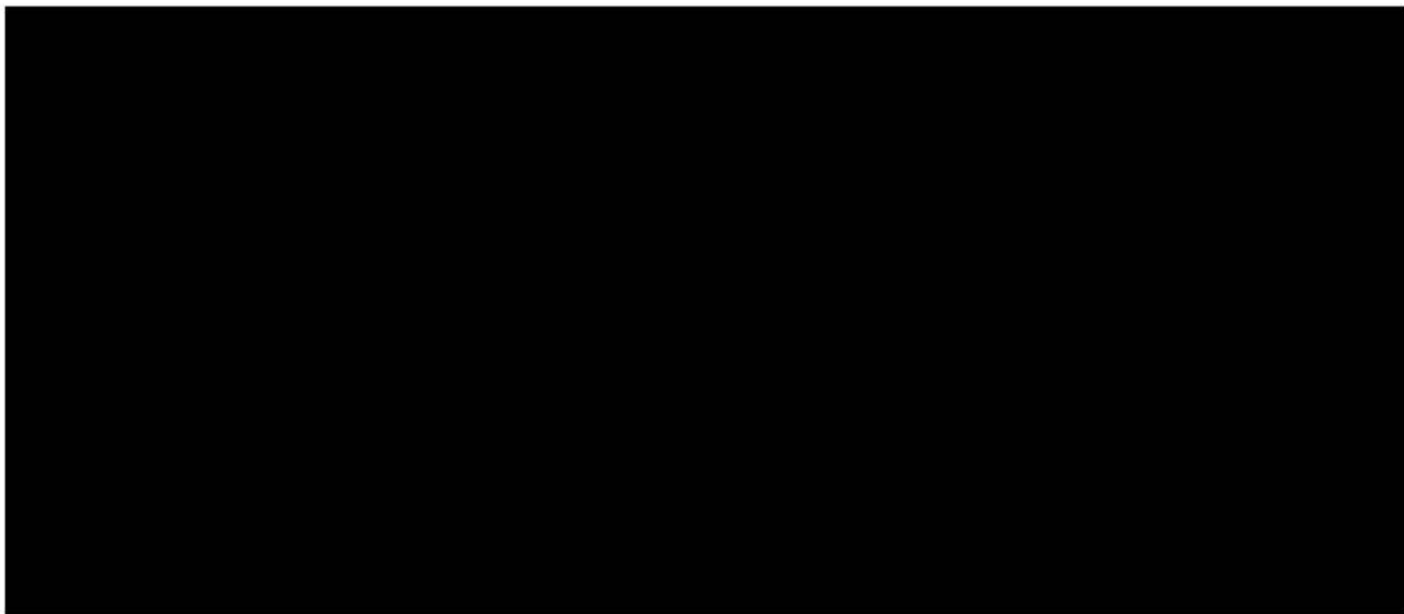


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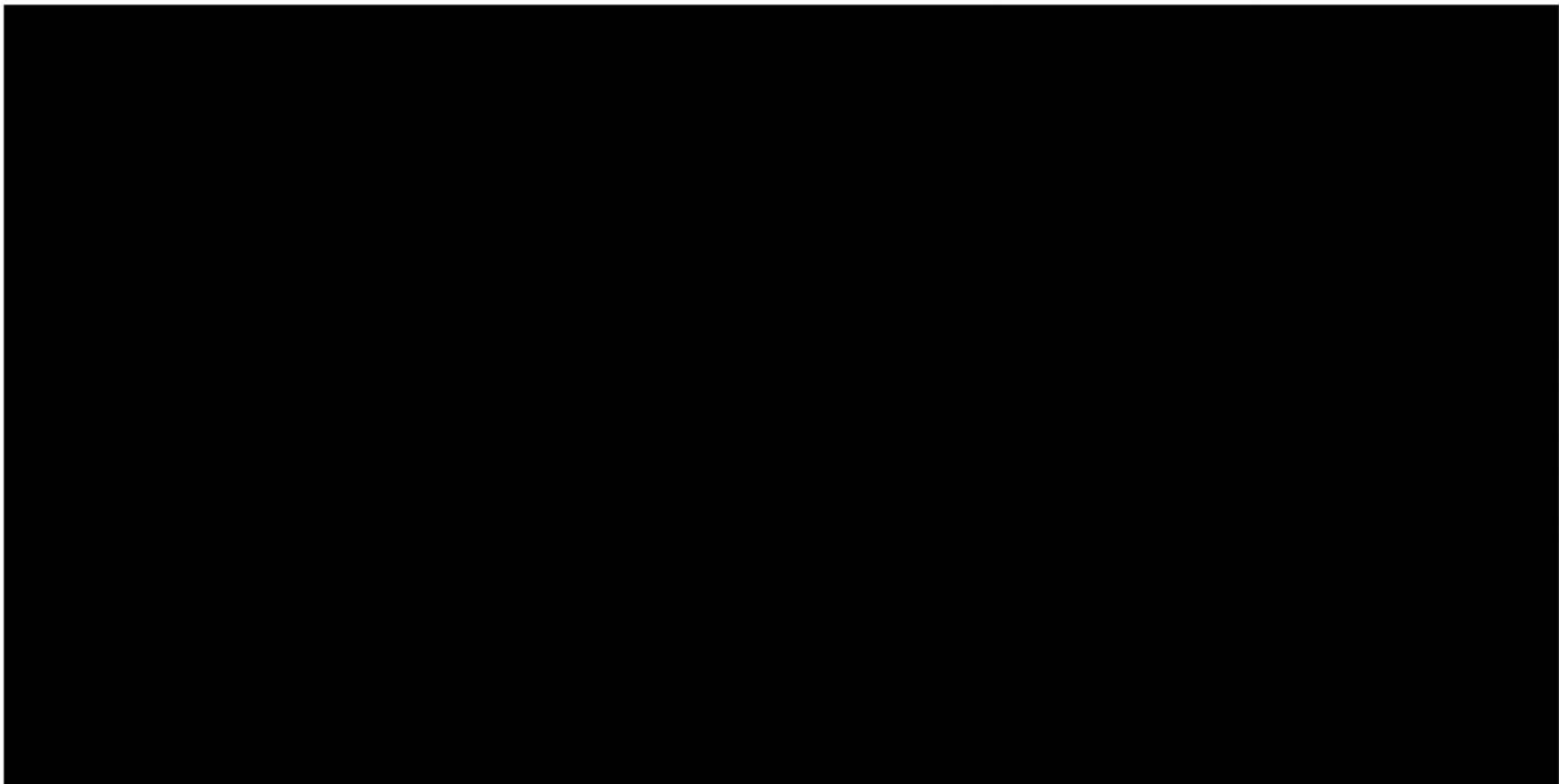
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2016.11.21 ZF TRW

Presentation

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2 [REDACTED] Active & Passive Safety Technology

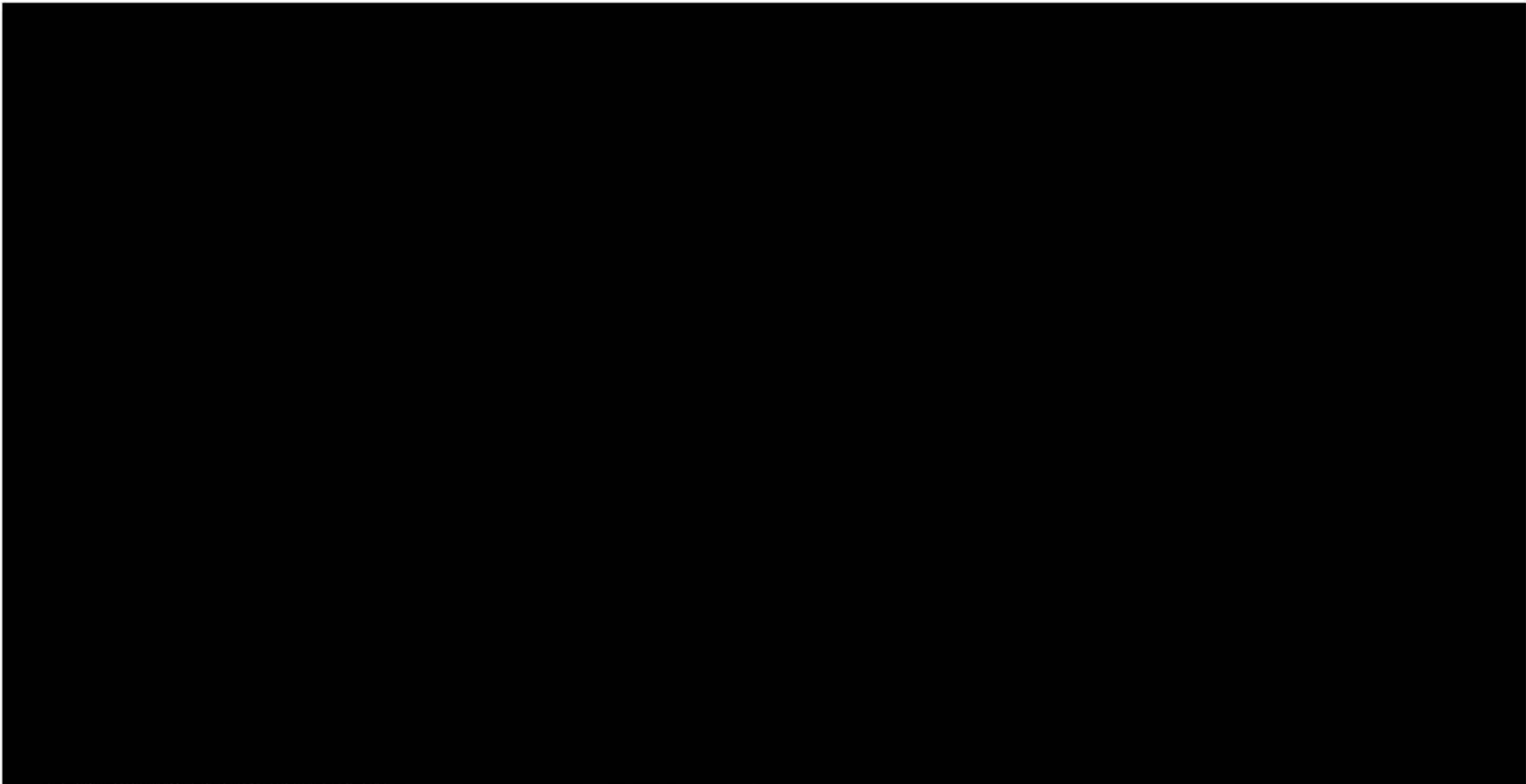
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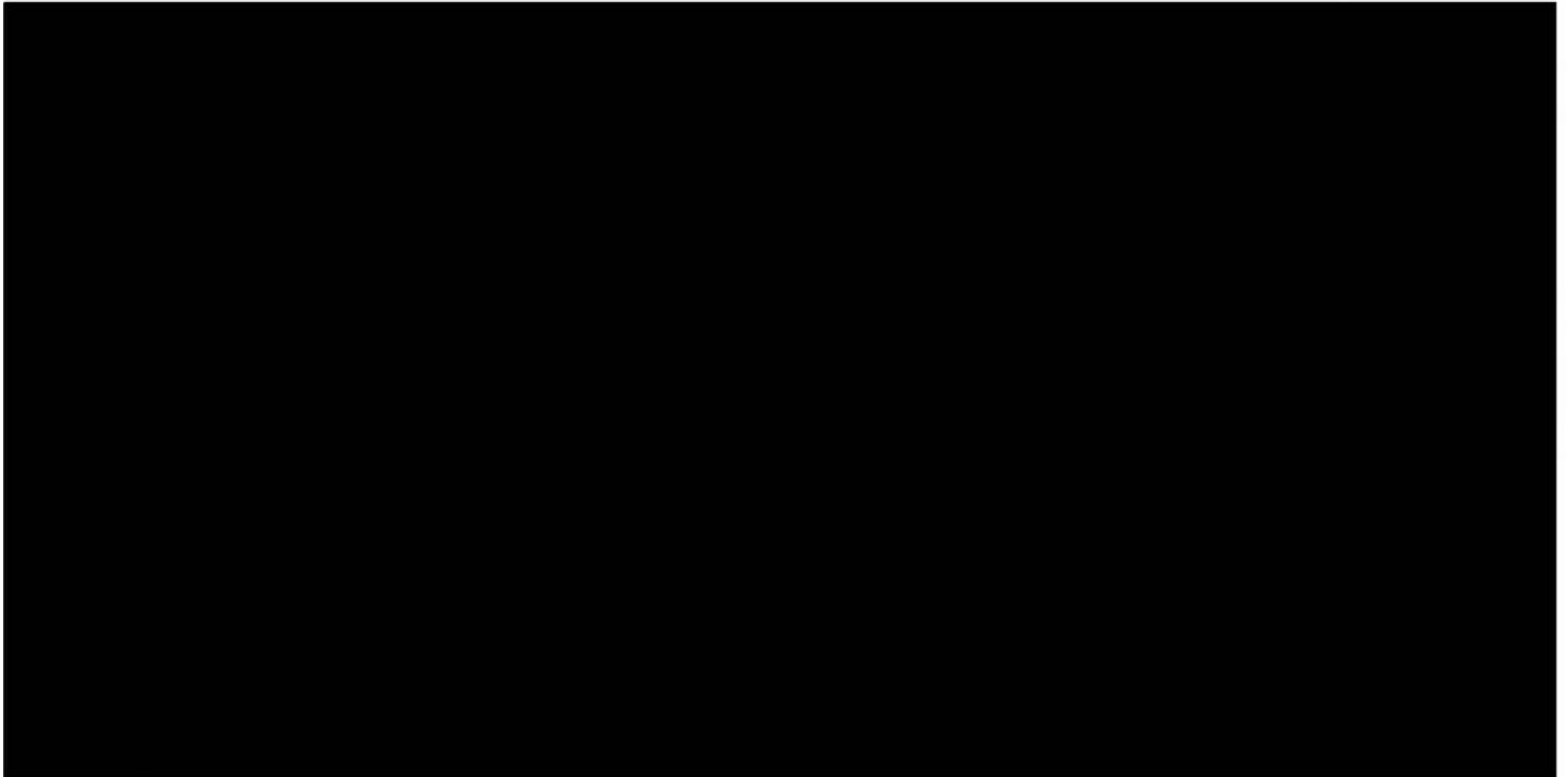


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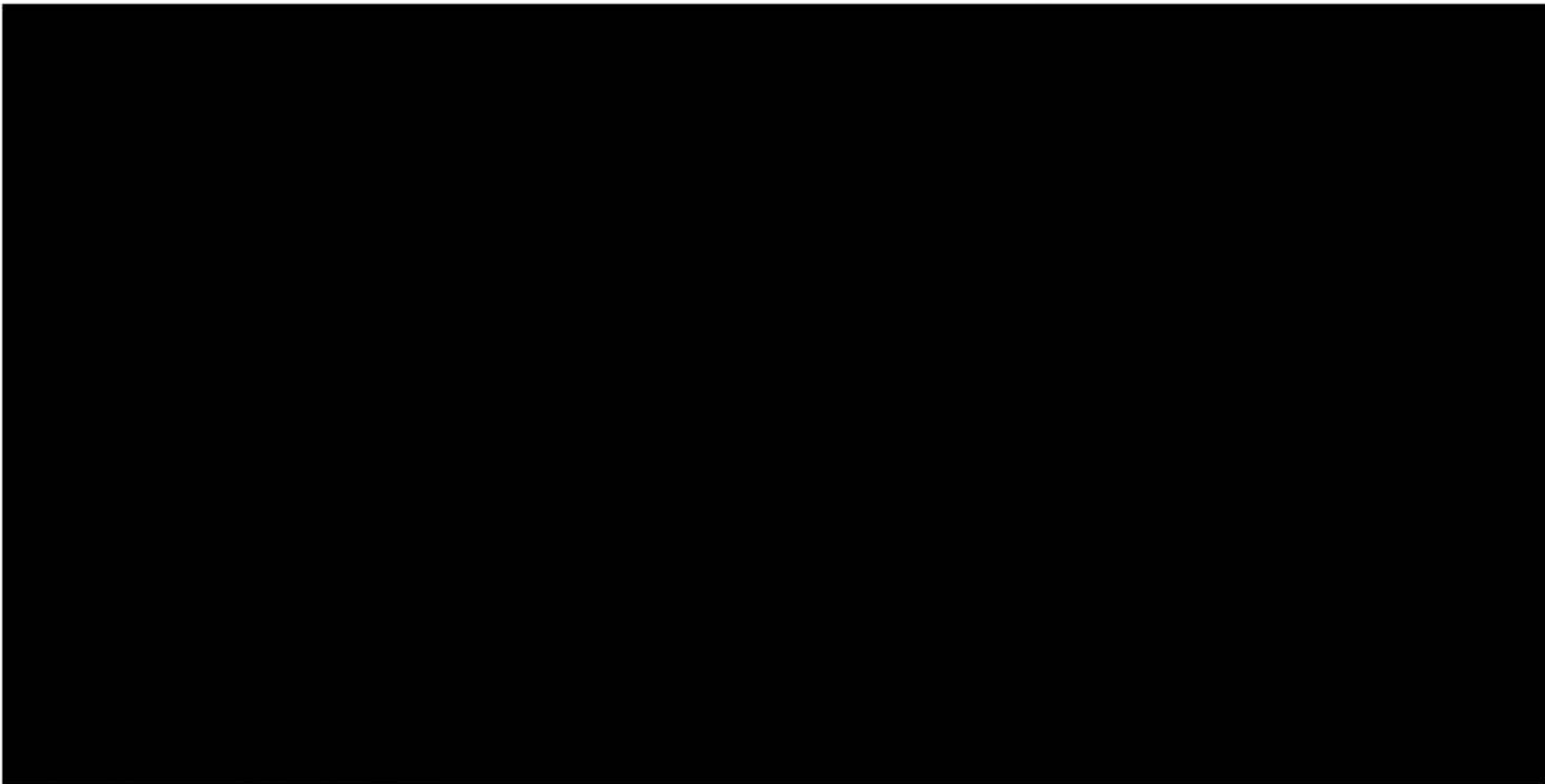
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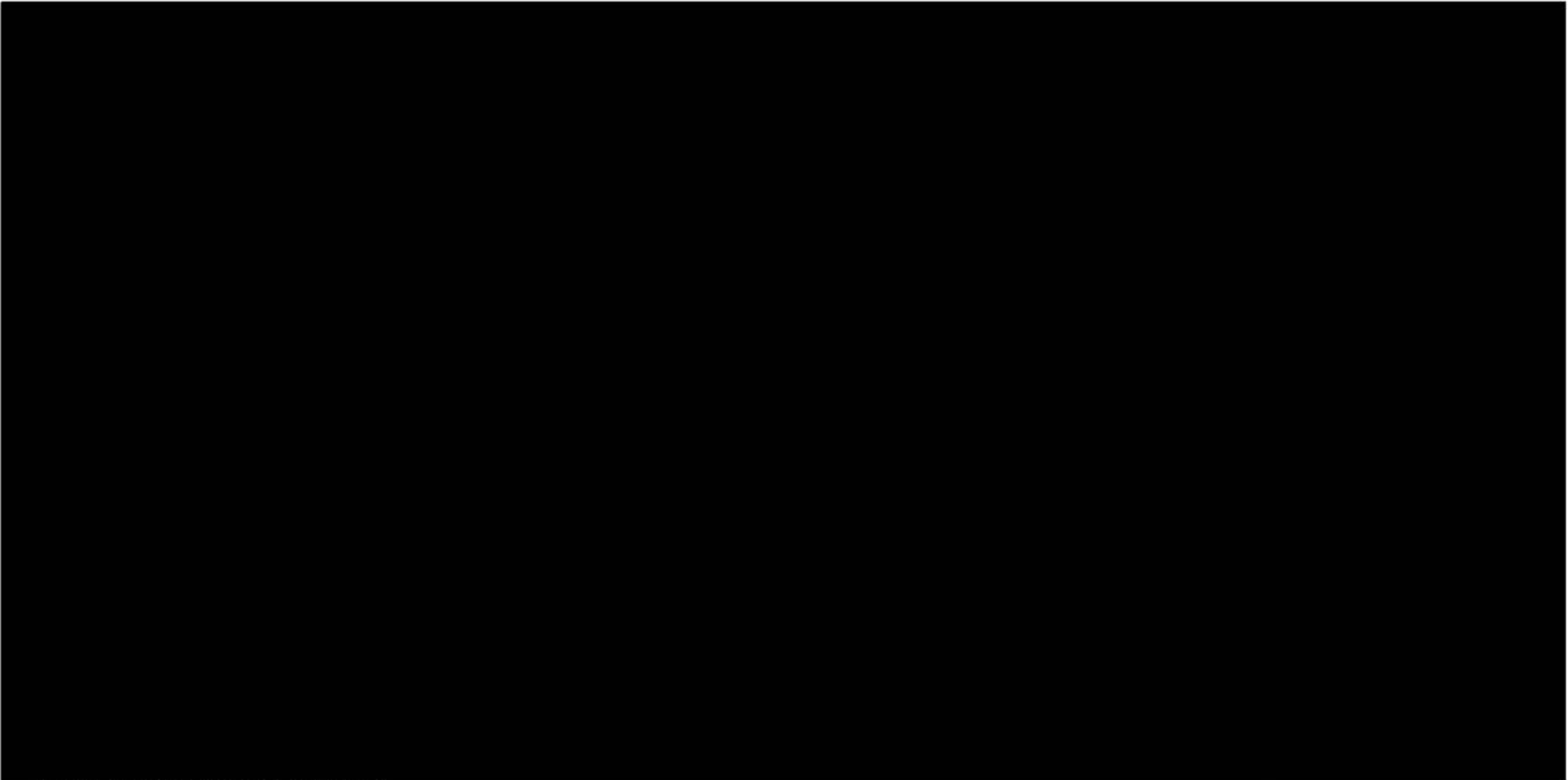




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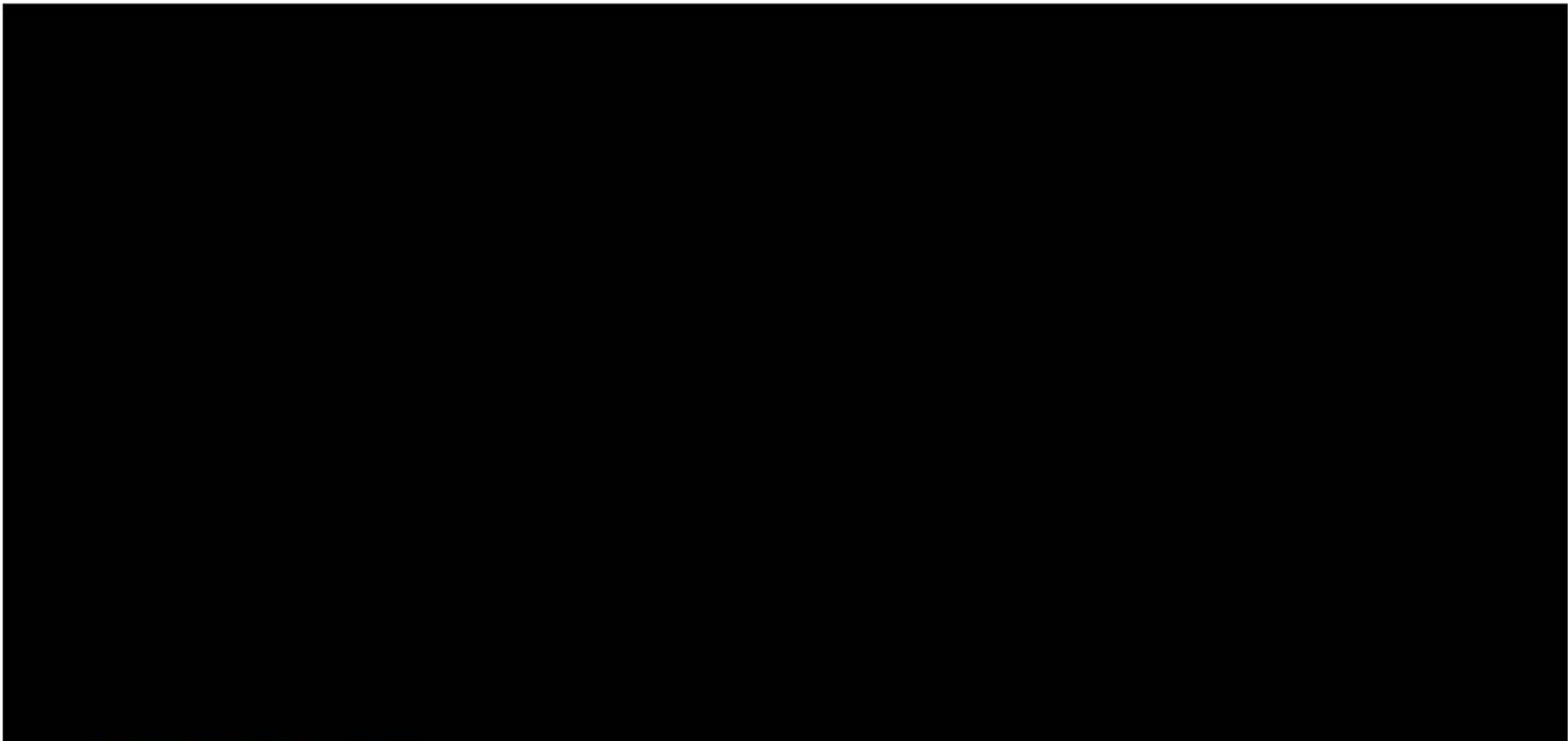
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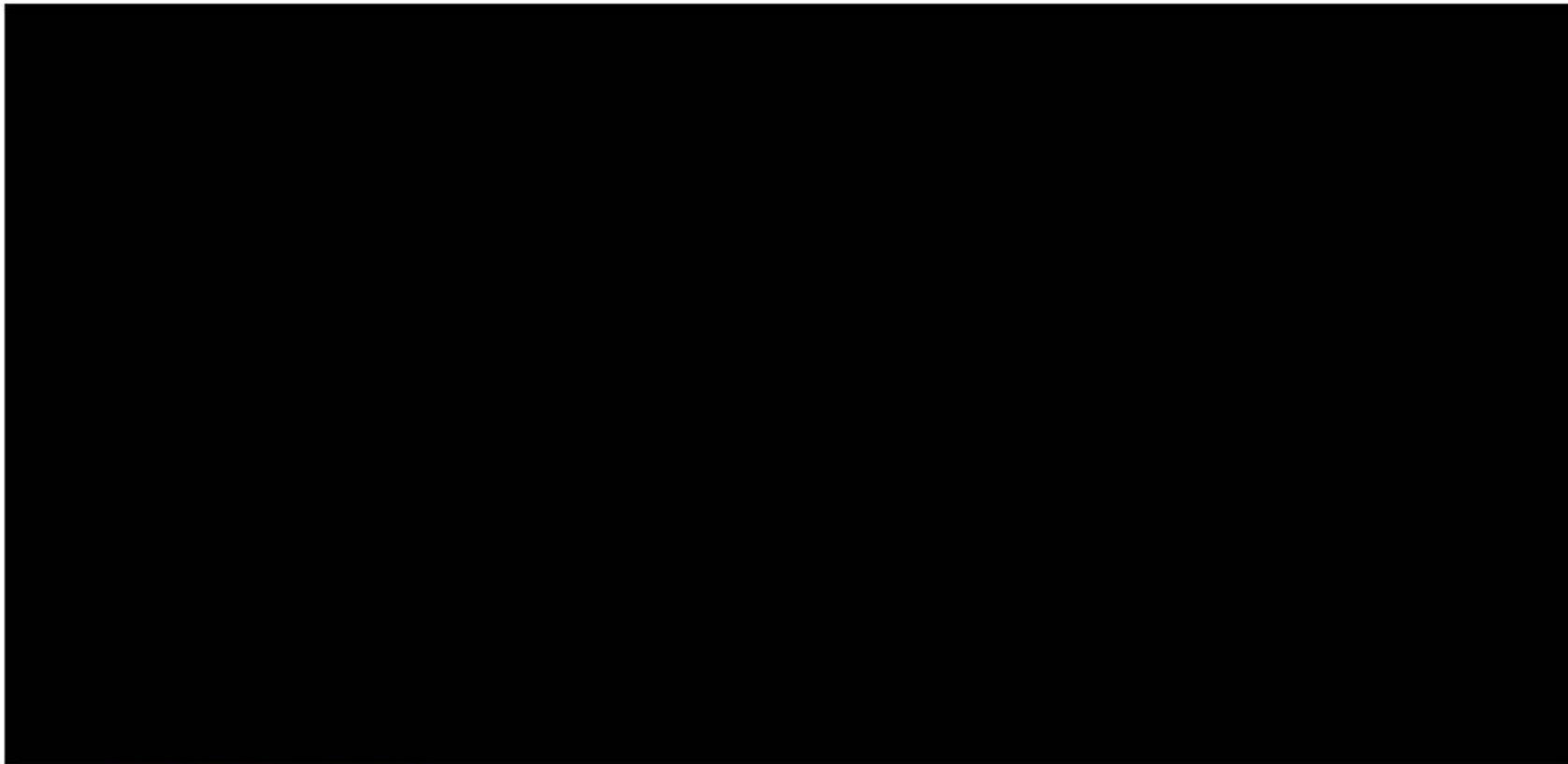
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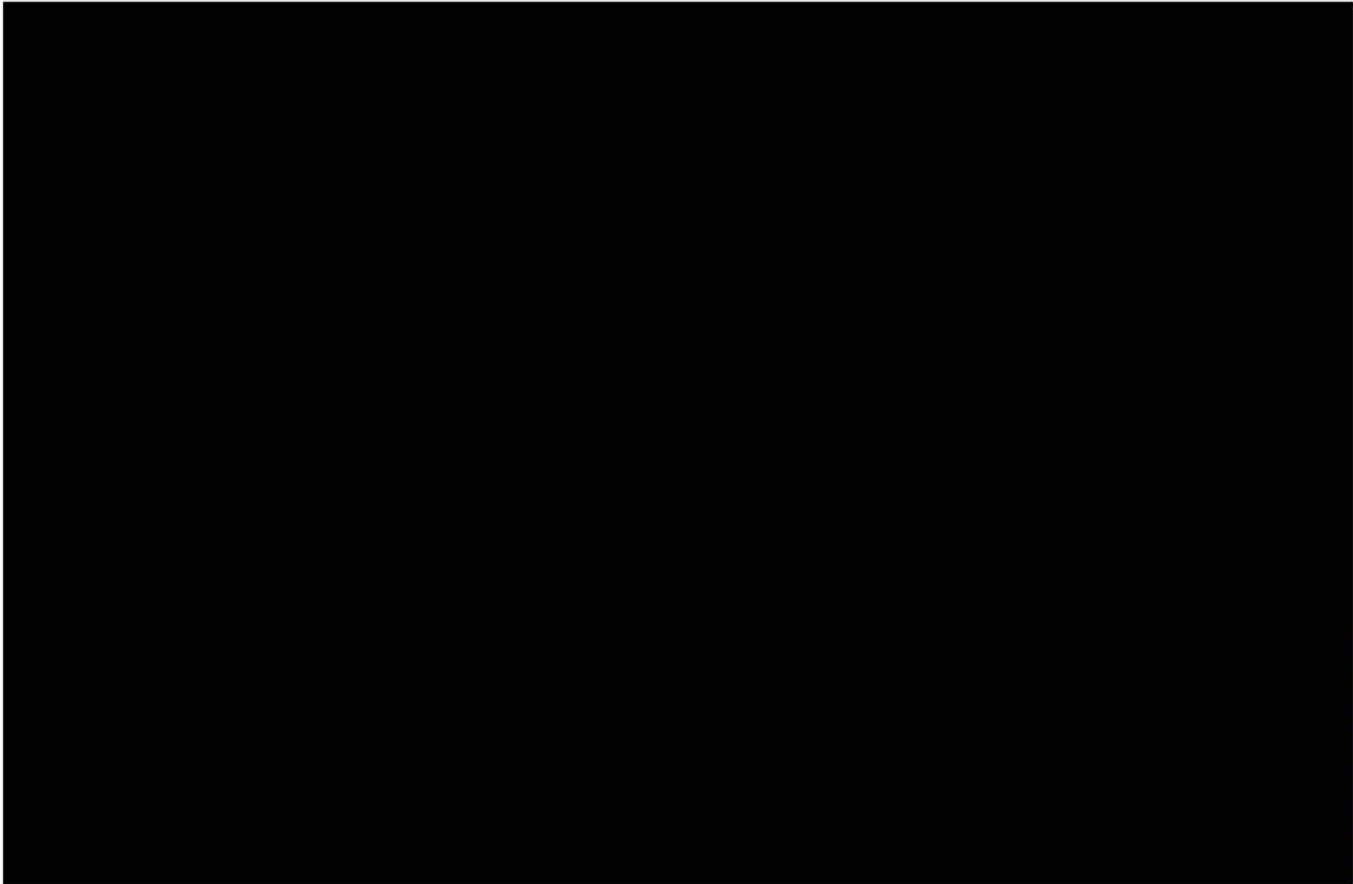
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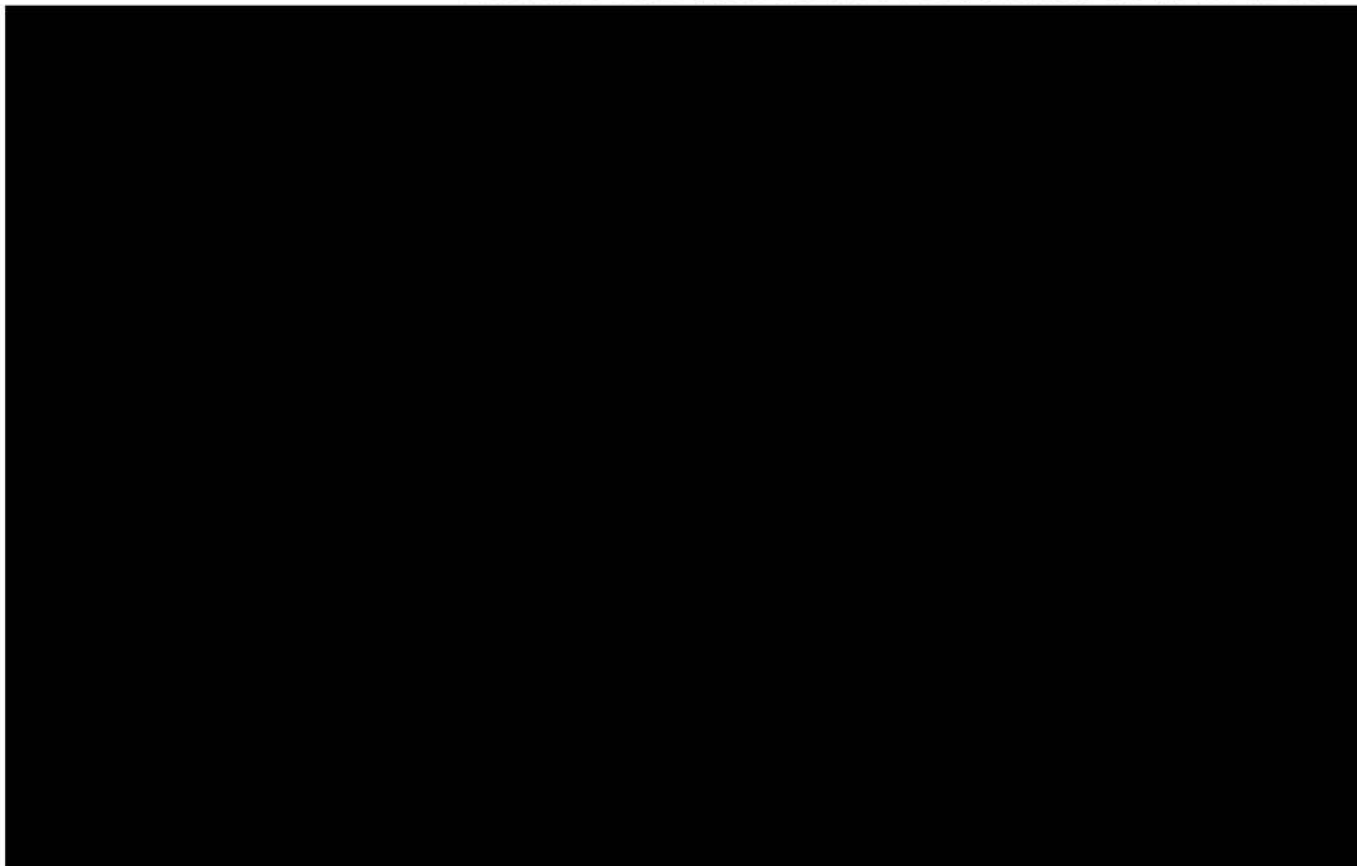
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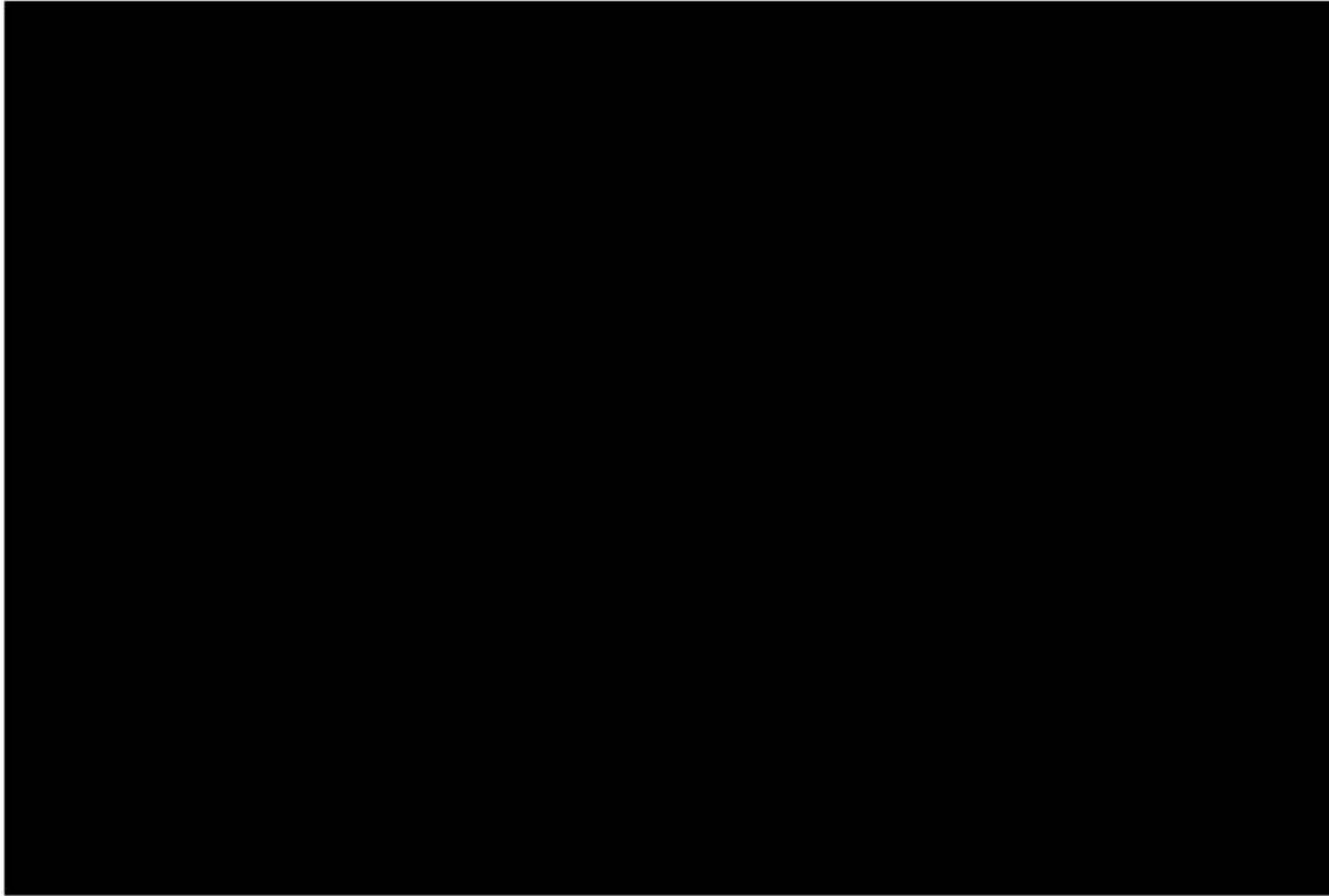
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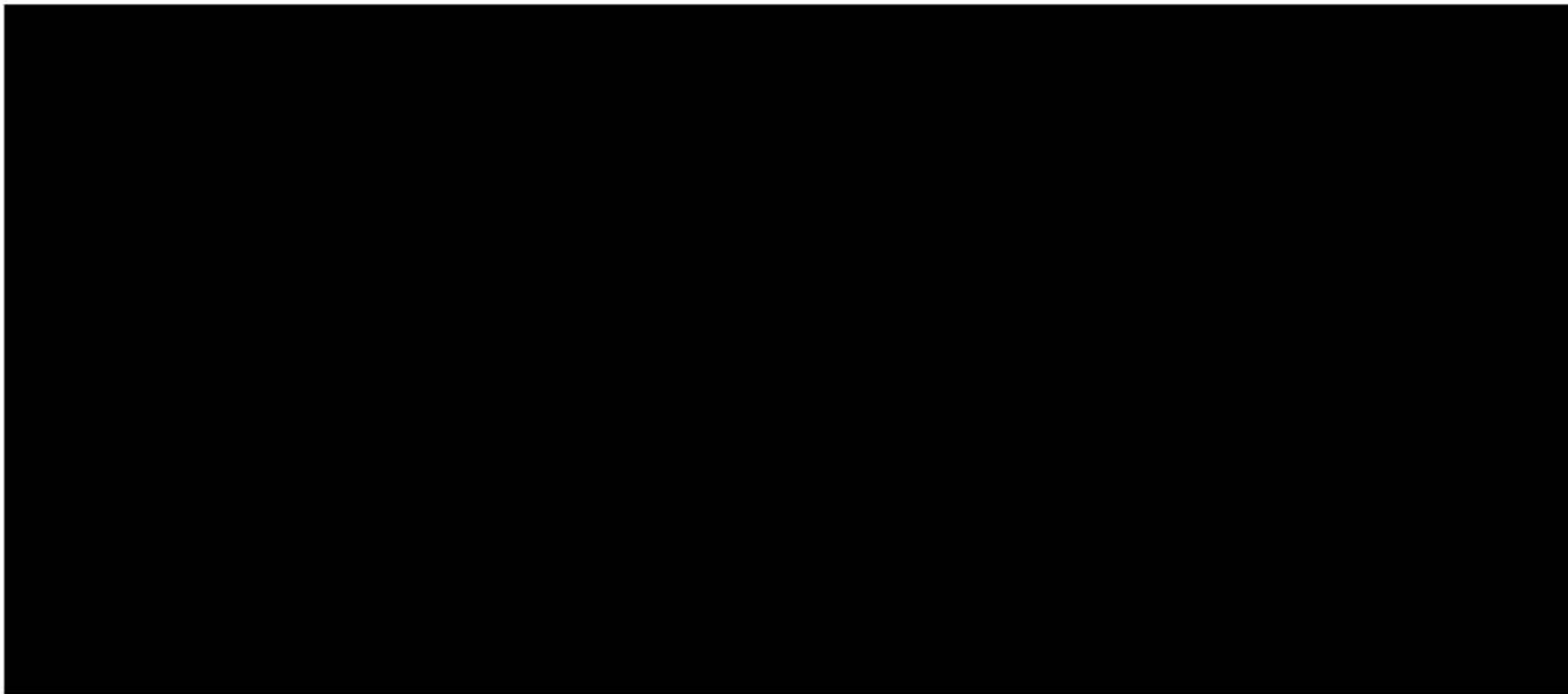
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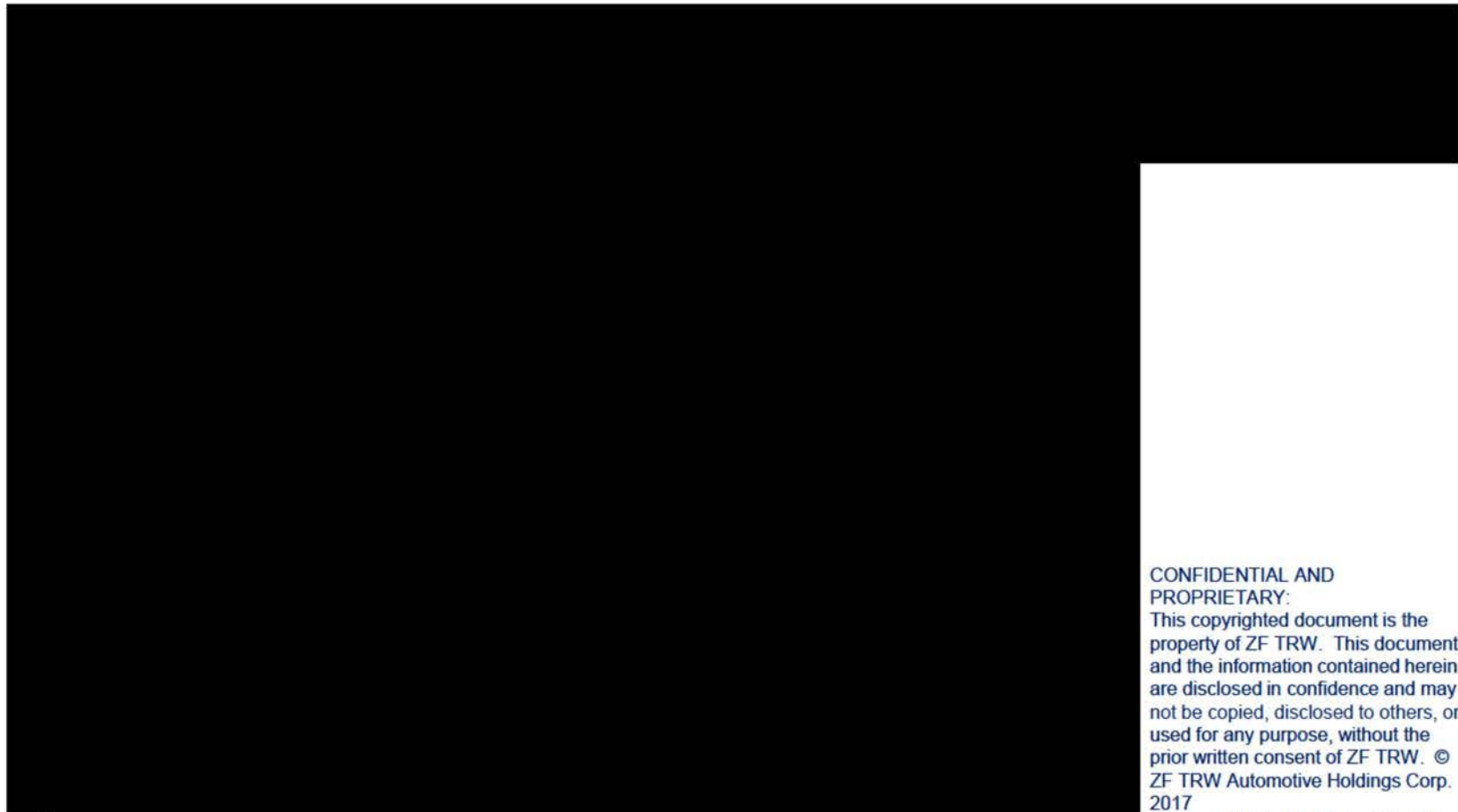
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Supplier Analysis

2017.02.02 ZF TRW

Presentation

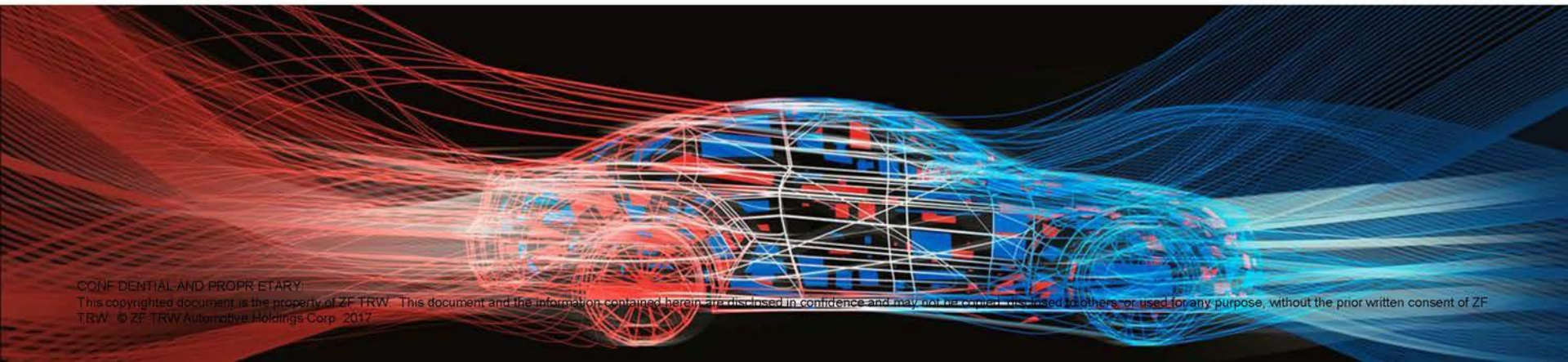
Hyundai Sonata Anchor Pretensioner

Active & Passive Safety Technology

ZF Friedrichshafen AG

Date: January 23, 2017

Updated: February 2, 2017



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