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Engineering Fraud Claims
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AGENDA

- Case studies on engineering fraud claims
- Details that needs attention when investigating a possible engineering fraud claim

Introduction

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- Insurance fraud is **any act committed with the intent to obtain a fraudulent outcome from an insurance process**. This may occur when a claimant attempts to obtain some benefit or advantage to which they are not otherwise entitled, or when an insurer knowingly denies some benefit that is due.

"Guidelines on Fraud Reporting and Claims" (PIAM)

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CASE STUDIES

Wind

&

Fire

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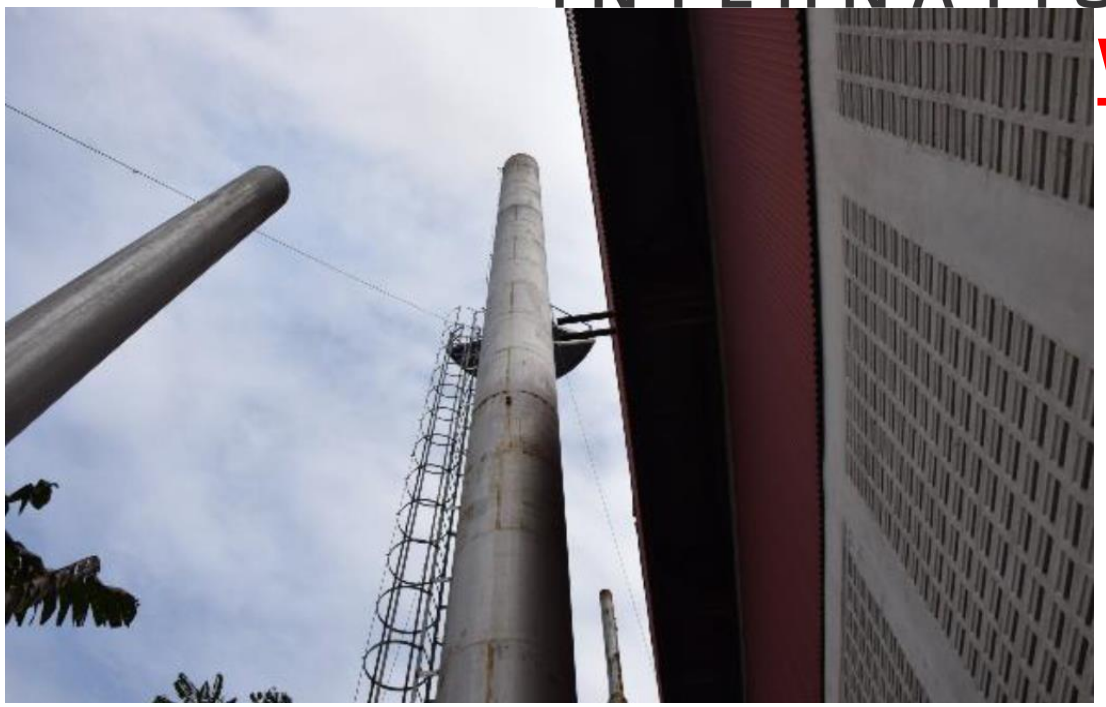
WIND



CHIMNEY COLLAPSE

- Windstorm reportedly caused, top section of chimney to collapse, ducting to tear a part, ID Fan support frames broken and ID Fan misaligned
- Picture above shows broken and collapsed top section of the chimney
- Chimney top section and ducting are situated outdoors while ID fan and its associated items are indoors

WIND

CHIMNEY COLLAPSE (Findings)

- Base of the chimney exhibited exfoliation corrosion
- The type of corrosion occurs over a period of years when the metal sections are exposed to humidity

CHIMNEY COLLAPSE (Findings)

- Torn ducting which connects boiler ID Fan to Chimney
- Torn section exhibited heavy corrosion; thickness reduction of ducting material detected

CHIMNEY COLLAPSE (Findings)

- Chimney top section thickness reading was measured at 1.85 mm
- Supposed thickness as per chimney specification is at 3 mm
- Approximately 38.3 % thickness reduction on chimney top section

CHIMNEY COLLAPSE (Findings)

- ID Fan bottom support frame legs broken; broken section is right below motor side of the ID Fan
- Cracks observed were diagonal to heat affected zone of the weldment

CHIMNEY COLLAPSE (Findings)

- ID fan imbalanced; as per maintenance record radial balancing was done
- No axial balancing was conducted to the ID Fan

CHIMNEY COLLAPSE (Analysis)

WIND

- AGI obtained possible windspeeds on the date of incident from meteorological department
- Utilizing civil engineering wind load calculation AGI obtained the load which could be imposed by the wind on the chimney
- Load was at **2.45 kg or 24.03 N**
- From chimney and ducting specifications obtained, the load of 24.03 N is not able to damage the chimney and its associated ducting

$F = A \times P \times Cd$

Whereby,

F = Wind load (pounds [lbs])

A = area (ft^2) of the surface the wind is acting on

P = pressure exerted by wind (0.00256 x velocity [v^2])

Cd = Drag coefficient for short flat plate = 1.4

Cd = Drag coefficient for long flat plate = 2.0

Cd = Drag coefficient for long cylinder = 1.2

Cd = Drag coefficient for short cylinder = 0.8

0.00256 is the coefficient derived from air density and gravitational acceleration , above values and formulas are referred from American Society of Civil Engineers Code (ASCE, 2003).

Hence, for a

Area = 4.5 ft x 11 ft (approximated to perfect rectangle) (Appendix 1 Photograph 15)
= 49.5 ft^2

Velocity = 30.42 mph

Pressure = 30.42 x 0.00256 = 0.078 pounds per square foot (psf)

Cd = 1.4 for short flat plate

The wind load would be,

F = 49.5 x 0.078 x 1.4

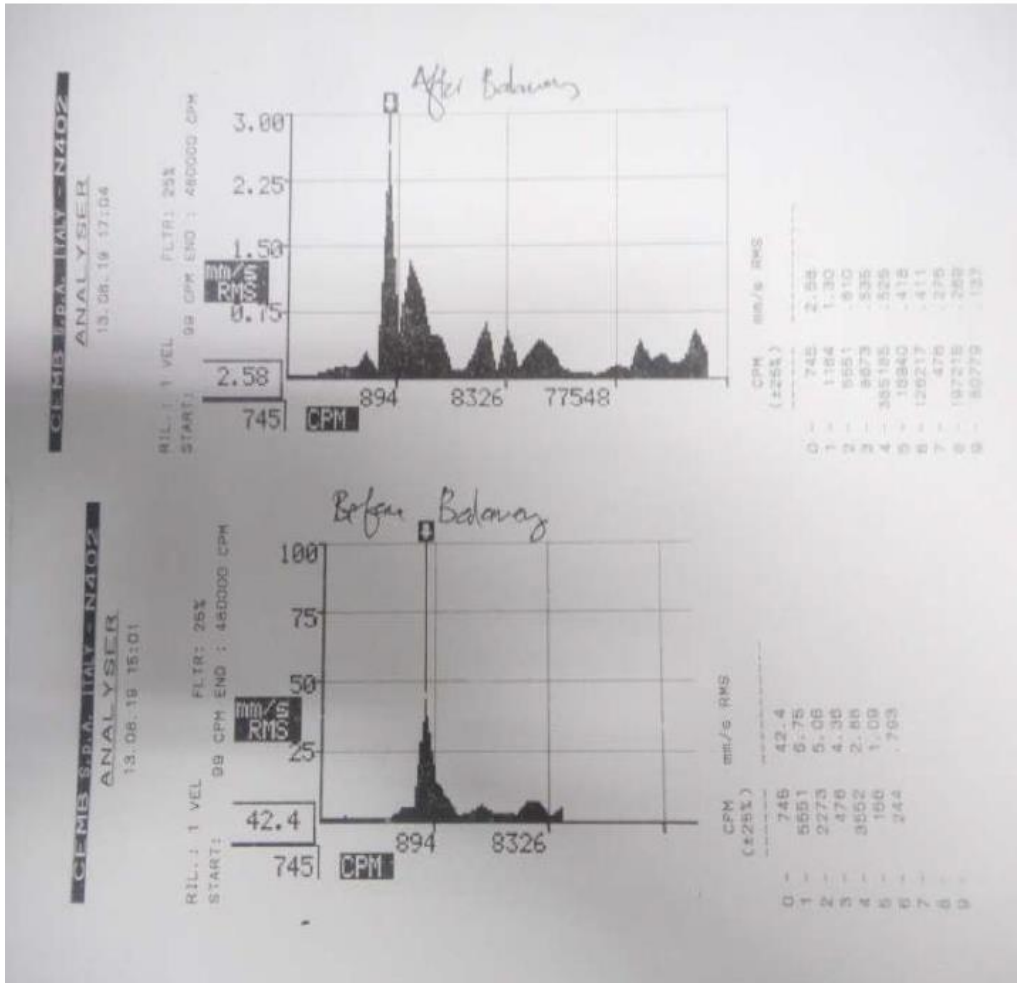
F = 5.4 lbs

Or

F = 2.45 kilograms (kg)

CHIMNEY COLLAPSE (Analysis)

- Balancing done after incident is radial balancing, happens when there is an imbalance in the impeller, due to dust accumulation or material loss on the impeller
- If wind loads have lifted the id fan and its ducting then it would affect both radial and axial balancing
- Just radial balancing raises a red flag



CHIMNEY COLLAPSE (Analysis)

WIND

- ID fan indoor, and no damage on indoor ducting
- Ducting damage only observed on outdoor ducting
- Hence, if wind was strong enough to damage the ID fan it would have damaged the ducting indoors as well
- Damage on just the frame legs on the impeller side shows that the crack was caused by excessive vibrations

CHIMNEY COLLAPSE (Conclusion)

- Thinning of chimney and ducting material provides clear evidence that the material has been deteriorating
- Strong wind has contributed to the damage however if the integrity of the material was not compromised it would not have been damaged

CHIMNEY COLLAPSE (Result)

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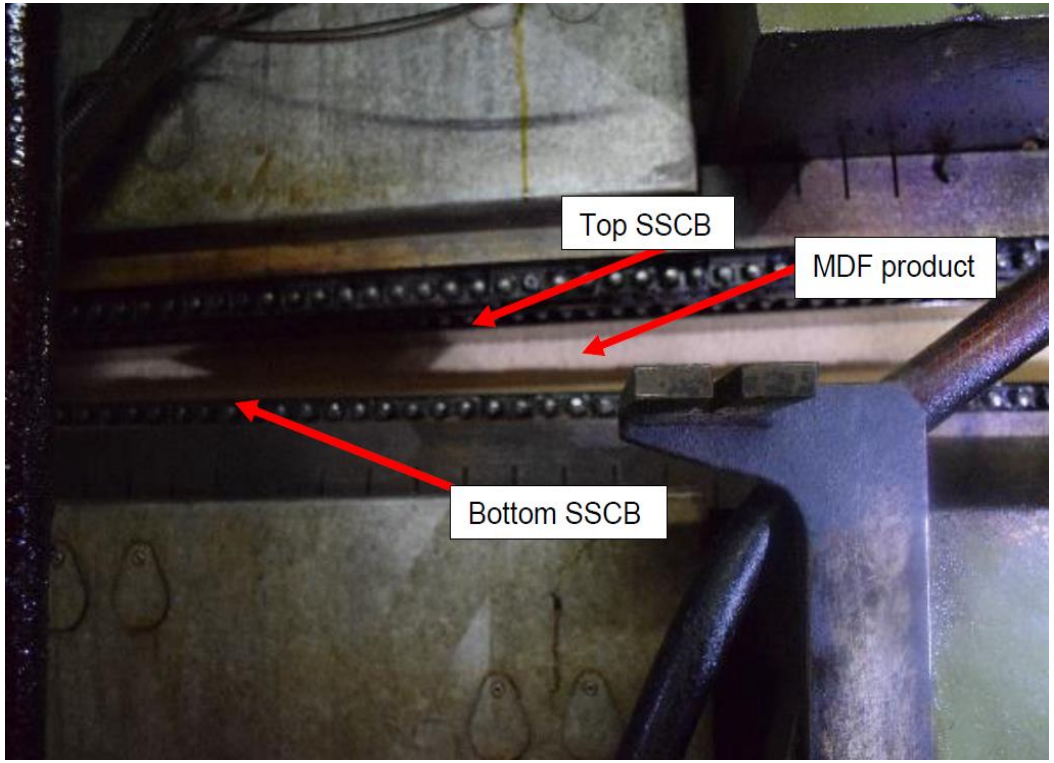
WIND

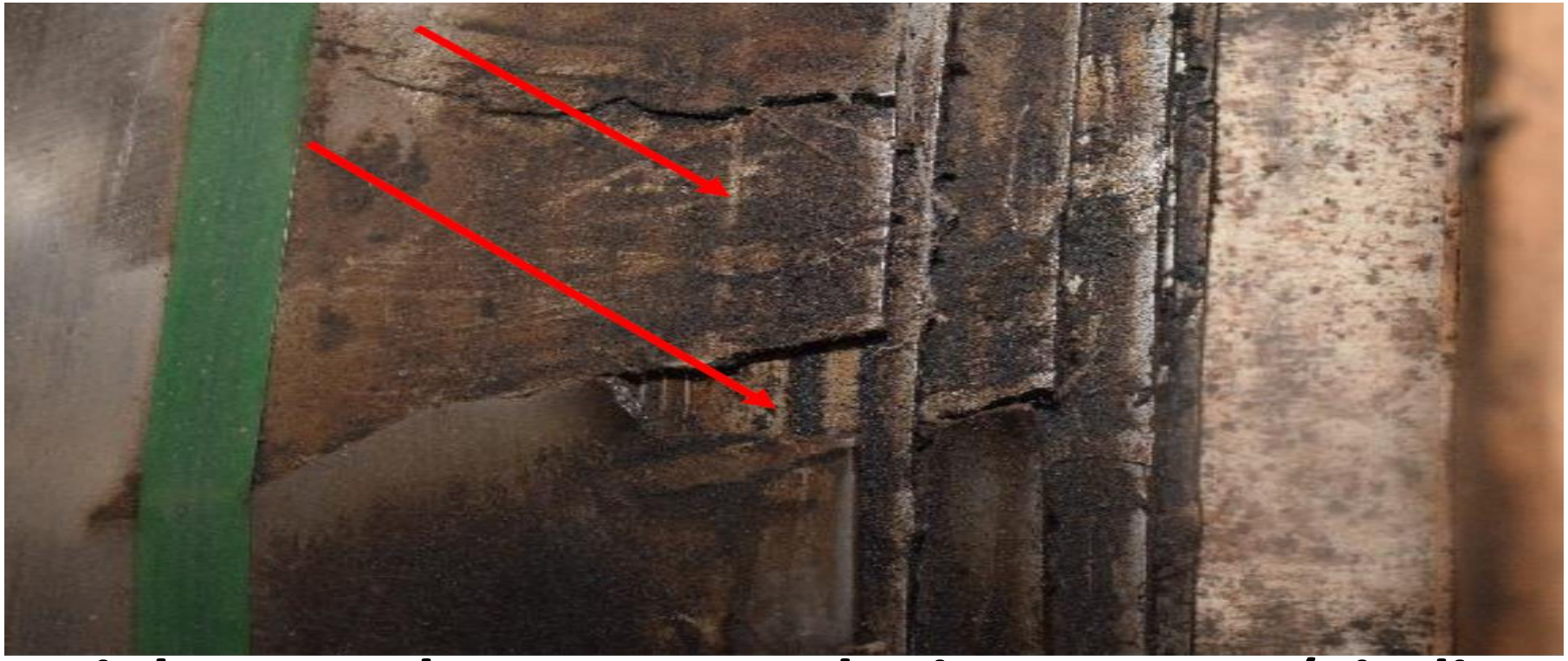
- Initial claim amount for the case was RM850k
- Since the damage was not due to windstorm as alleged, claim was repudiated

FIRE



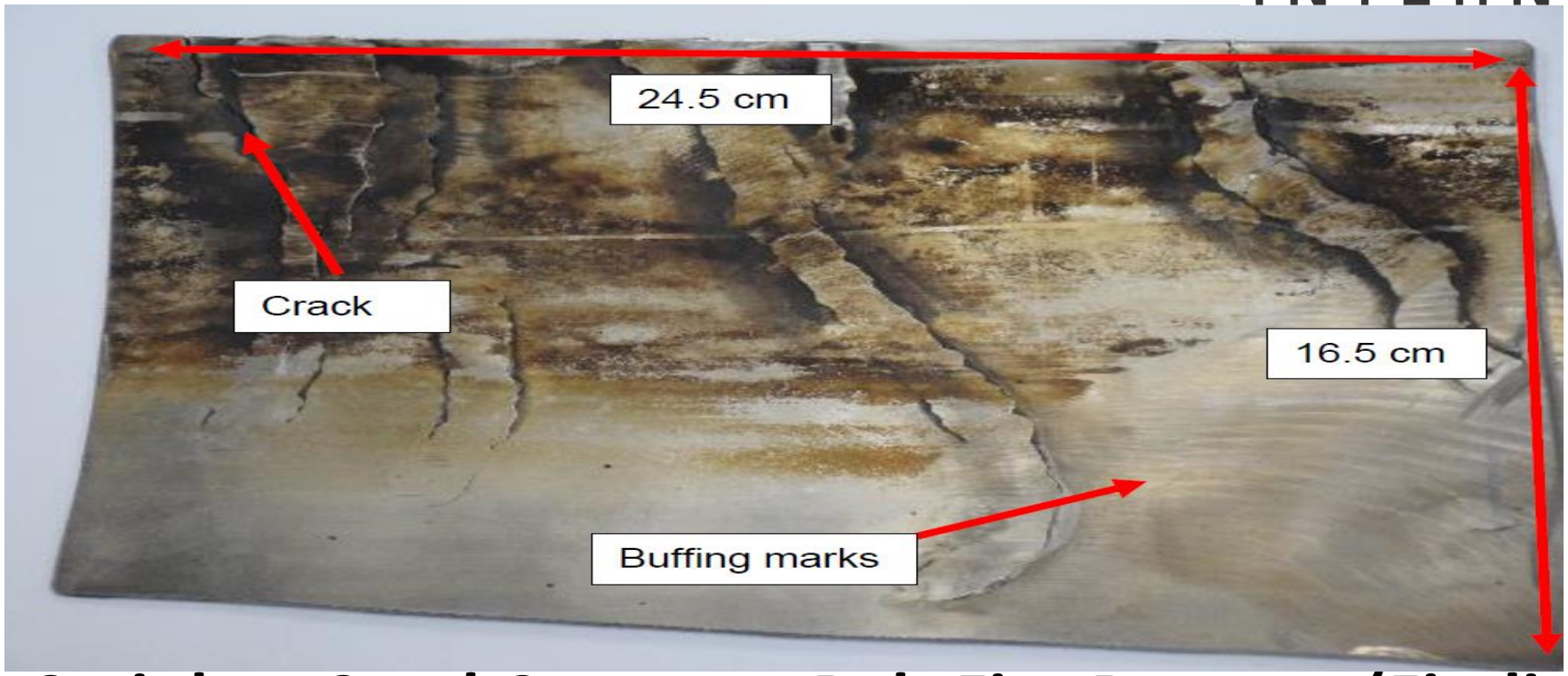
Stainless Steel Conveyor Belt Fire Damage

- Fire incident allegedly caused medium density fiber board pre-press machine's stainless steel conveyor belt (SSCB) to crack on its edges
- The SSCB was replaced and allegedly damaged SSCB was kept in storage



Stainless Steel Conveyor Belt Fire Damage (Findings)

- The edges of the SSCB was observed to have cracked through out its length
- Length of the crack propagation was measured to be approximately same on each crack



Stainless Steel Conveyor Belt Fire Damage (Findings)

- A sample was cut out for further analysis from the SSCB
- Crack marks propagation was observed along a line similar to welding
- Buffing marks were also observed on the SSCB sample

Material Safety Data Sheet

1. Product and company identification

Product name	Viscogen KLK 25
MSDS #	450772
Historic MSDS #:	65025-AE
Code	450772-US03
Product use	Chain lubricant. For specific application advice see appropriate Technical Data Sheet or consult our company representative.

5. Fire-fighting measures

Flash point	Open cup: 260°C (500°F) [Cleveland.]
Fire/explosion hazards	In a fire or if heated, a pressure increase will occur and the container may burst.
Extinguishing media	
Suitable	Use an extinguishing agent suitable for the surrounding fire.
Not suitable	Do not use water jet.
Fire-fighting procedures	Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
Hazardous combustion products	Combustion products may include the following: phosphorus oxides carbon oxides (CO, CO_2) (carbon monoxide, carbon dioxide) sulfur oxides (SO, SO_2 etc.) nitrogen oxides (NO, NO_2 etc.)

Stainless Steel Conveyor Belt Fire Damage (Analysis)

- Grease flash point was observed to be 260° C
- Hence the fire that occurred can be stated to be emitting heat above 260° C
- However, the amount of grease available at the point of alleged fire incident is not in a volume that would sustain fire for prolonged period

CLARION Boards

MATERIAL SAFETY DATA SHEET

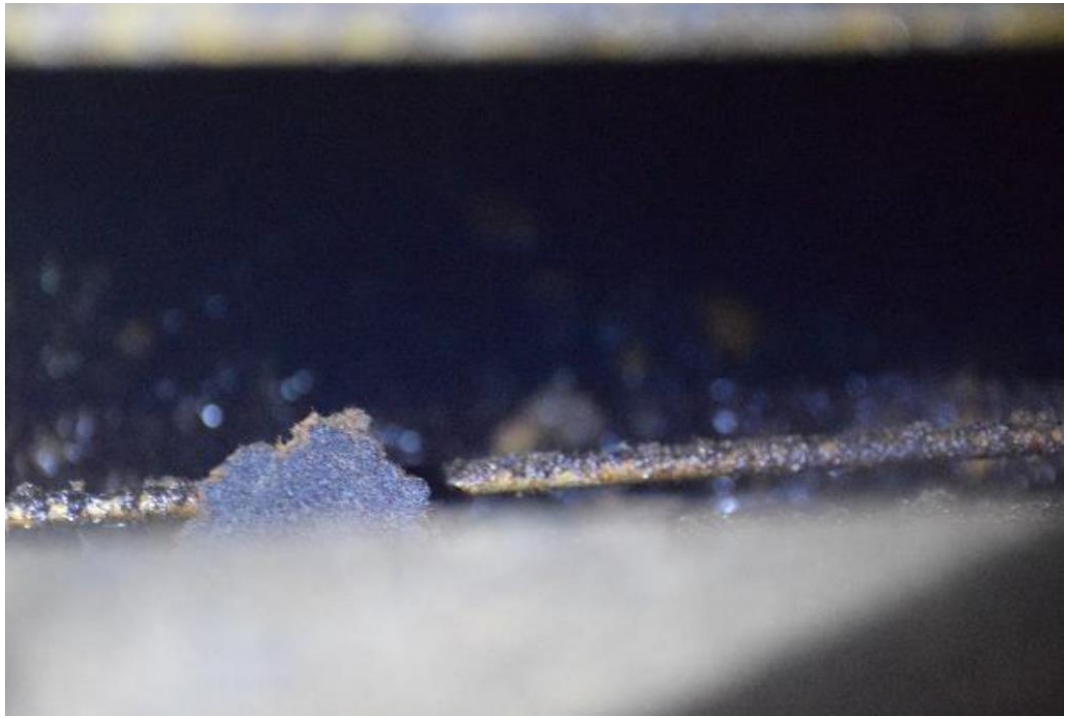
MEDIUM DENSITY FIBERBOARD

PHYSICAL DATA

BOILING POINT - Not Applicable
SPECIFIC GRAVITY - Variable (Dependent on wood species and moisture content)
VAPOR DENSITY - Not Applicable
% VOLATILES BY VOLUME - Not Applicable
MELTING POINT - Not Applicable
VAPOR PRESSURE - Not Applicable
SOLUBILITY IN H20 (% BY WT.) - Insoluble
EVAPORATION RATE (Butyl Acetate = 1) - Not Applicable
pH - Not Applicable
APPEARANCE AND ODOR - Light to dark brown solid. Color and odor are dependent on the wood species and time since board was manufactured.

SECTION IV - FIRE AND EXPLOSION DATA

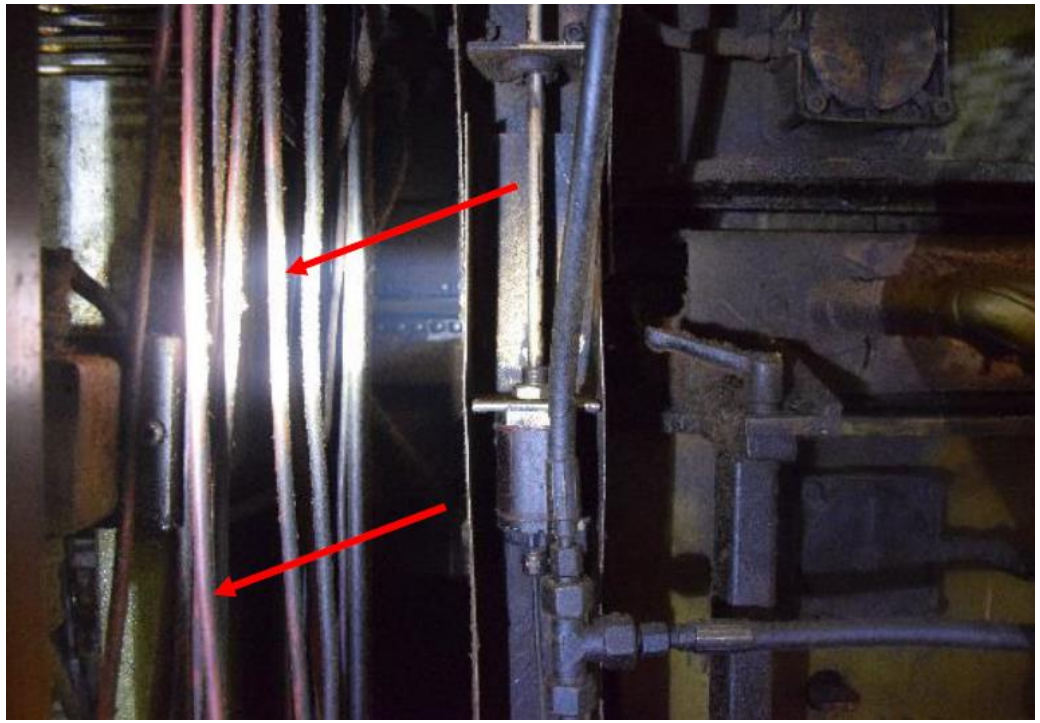
FLASH POINT - Not Applicable
AUTO IGNITION TEMPERATURE - 425 - 475 deg F
FLAMMABLE LIMITS – Not Applicable
FIRE EXTINGUISHING MEDIA - Water
SPECIAL FIRE FIGHTING PROCEDURES - Fire fighting procedures for wood products are well known.



FIRE

Stainless Steel Conveyor Belt Fire Damage (Analysis)

- The next available fuel load was the MDF board debris and the MDF board itself
- The auto ignition temperature of MDF was stated by multiple MDF MSDS to be at 475°F (246°C)
- Therefore, the initial fire fueled by grease needs to burn for a certain period of time till it can convey enough energy for MDF to burn



A stainless steel with excellent oxidation and creep resistance in cyclic conditions that is best employed in temperatures up to **1150 °C/2100 °F.** There is a slight susceptibility to embrittlement during continuous operation at 600–850 °C/1110–1560 °F.

Stainless Steel Conveyor Belt Fire Damage (Analysis)

- Stainless steel service temperature is ranging from 600 °C to 1150 °C
- From the observation of alleged section of fire occurrence, no signs of temperature being above the state service temperatures

3.2 Optical Metallography

Cross-sectional cuttings were prepared at near the normal surface and grinding surface as illustrated in Figure 2 to Figure 5 respectively for metallographic examination according to ASTM E3-01: Standard Guide for Preparation of Metallographic Specimens. Metallographic examination on the sample revealed the following features:

a) Figure 1 reveals the grain structures of weld and base metal areas.
b) Figure 2 shows the microstructure of base metal consisting of martensitic stainless steel.
c) Figure 3 shows Widmanstätten ferrite structures of weld areas.

Stainless Steel Conveyor Belt Fire Damage (Analysis)

- Samples were sent to metallurgical lab for analysis
- Analysis results were in line with AGI's findings

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FIRE

Conclusion

- The fire if at all did occur, cannot damage the stainless steel conveyor belt
- Damage analysis on the sample obtained revealed that the damage seen is a pre-existing damage which was welded by the insured
- The fire incident was used to exaggerate the claim

Engineering Fraud Diagnosis

- The key factor in engineering fraud case investigation is understanding on the machine
- Every machine is unique, its always best to engage someone who knows the machine and has worked with the machine before in the case as the investigator or as an advisor
- If you do not have an expert engaged in the case, or do not have the means to engage one, ensure you do your research prior to case engagement and investigation

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Global Solution to:

Fire, Explosion / Implosion Investigation
Vehicle Accident Reconstruction
Mechanical, Electrical and Electronic Failures Investigation
Complex Engineering Losses
Metallurgical Analysis
Questioned Documents & Handwriting Examination
Damage Assessment & Disaster Restoration
Infrared Thermography
Covid-19 Sanitization

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