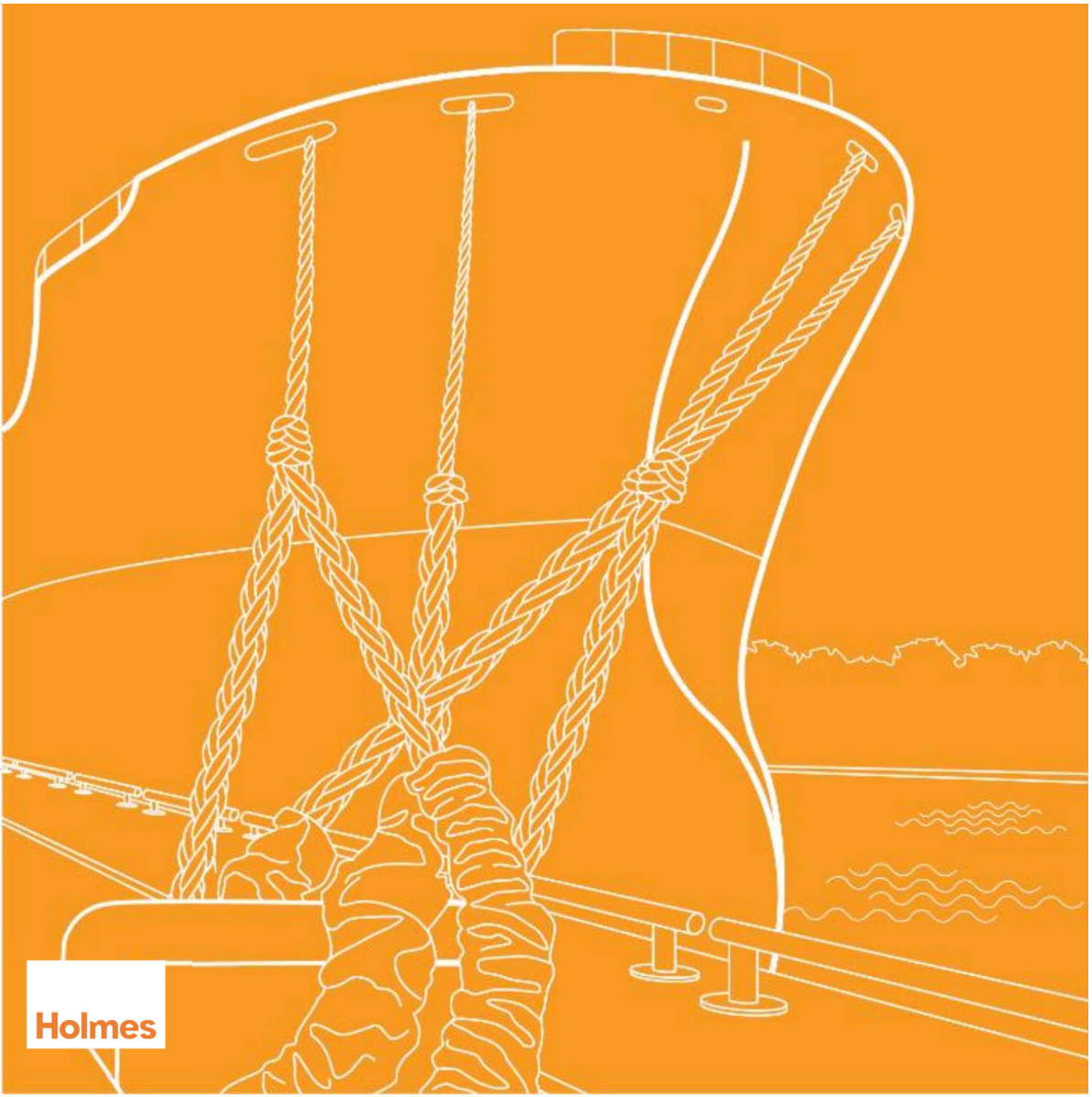


Snapback Characterisation for Arresting Structure Design:

Physical Testing Insight

August 2024

NZ's largest commercial testing lab

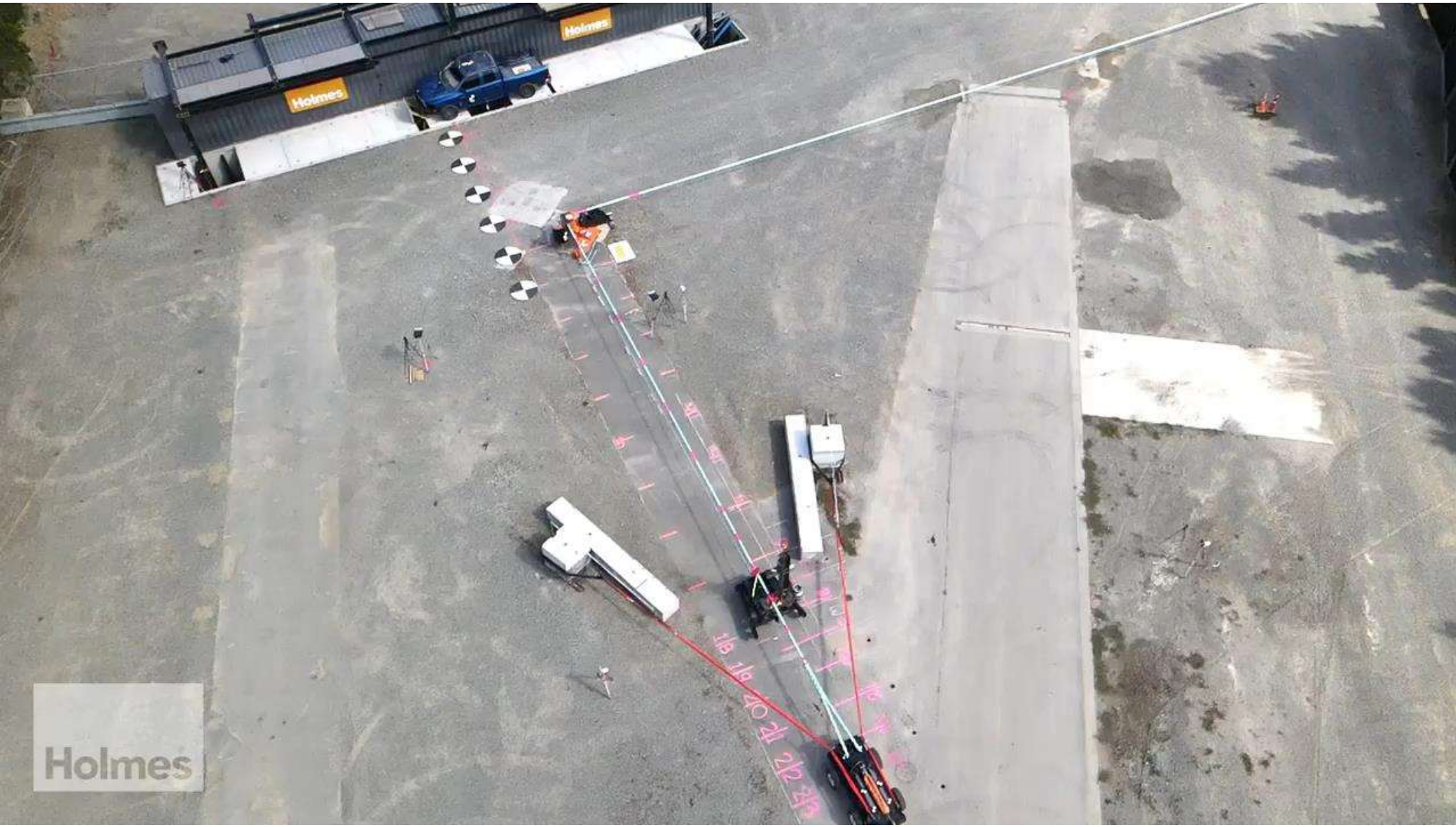
45,000 ft² R&D facility

Award winning technology

Innovative intellectual property

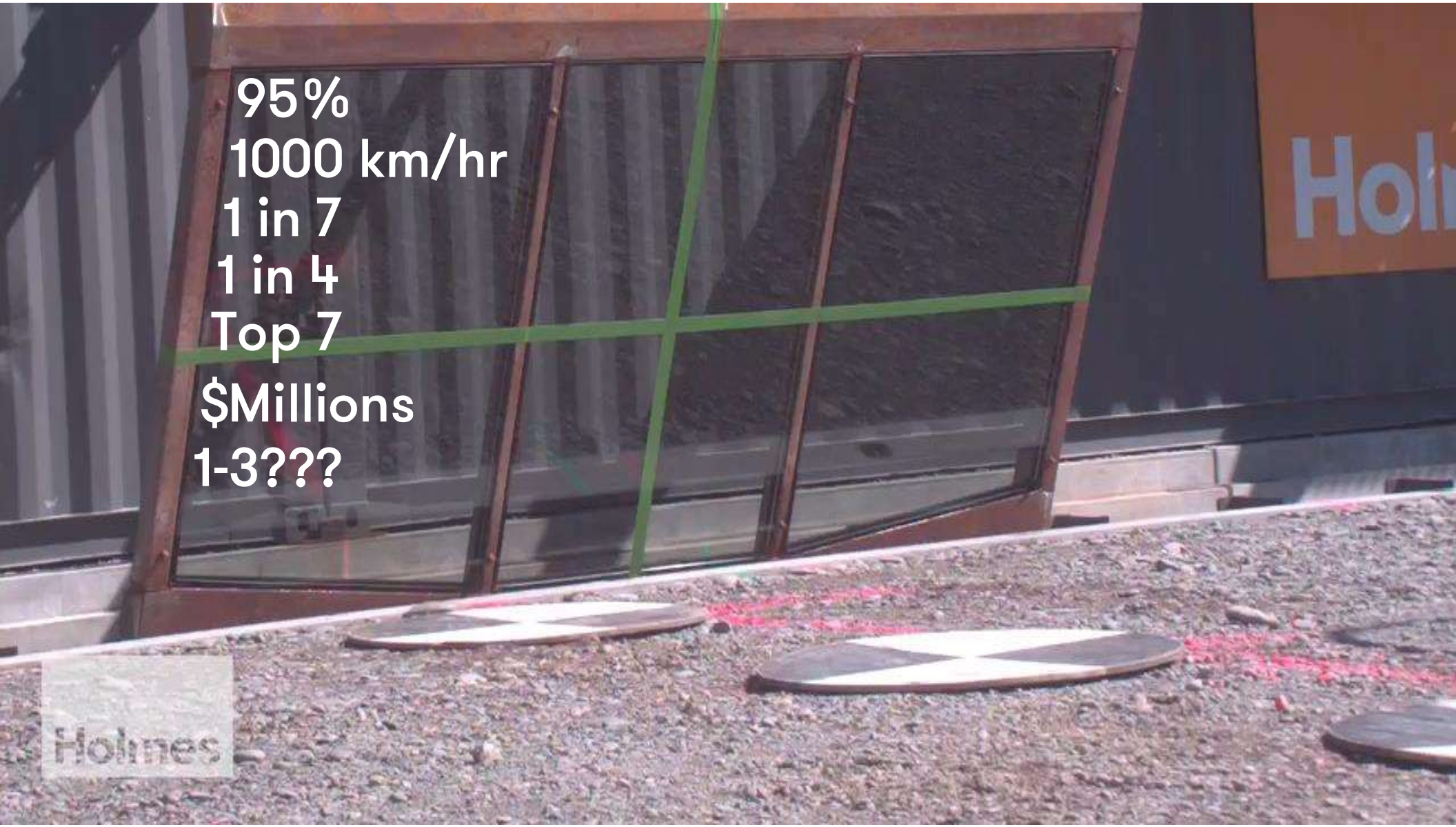
Outstanding technical solutions

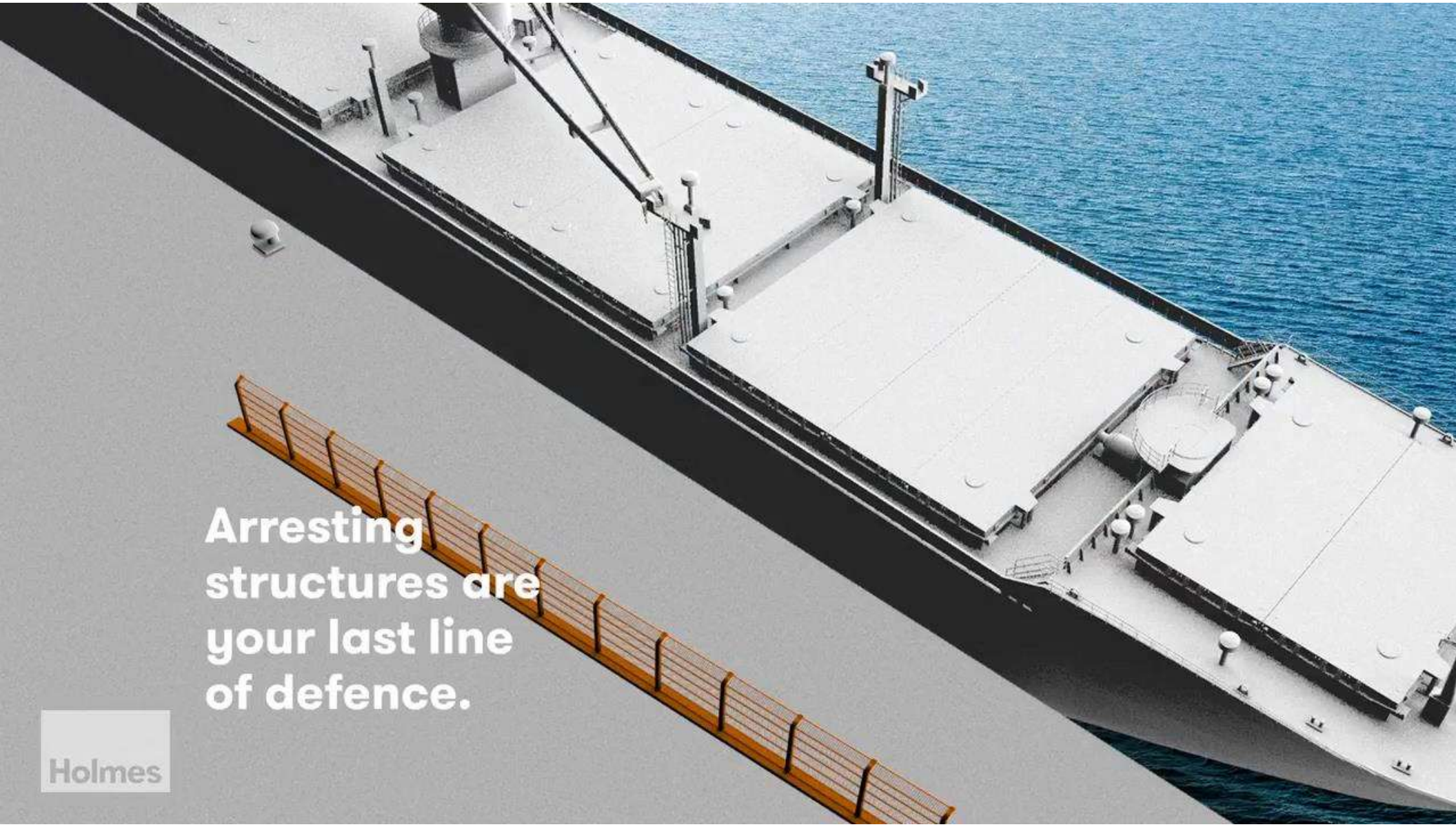
Enhancing client's competitive positions


Holmes
Holmes
Holmes

BHP case study
The event – Hay Point Coal Terminal

Holmes


95%
1000 km/hr
1 in 7
1 in 4
Top 7
$Millions
1-3???
Holmes


Arresting
structures are
your last line
of defence.
Holmes

PIANC
The World Association for Waterborne Transport Infrastructure

Maritime Navigation Commission

MarCom

WG 251

GUIDANCE ON THE DESIGN OF PARTED MOORING LINE ARRESTING SYSTEMS

"To provide guidance on risk and reliability informed design of parted mooring line arresting systems and guidance on the quantification of design energy, reactions, and probability of parted mooring line events."

Holmes

A challenge that's far from simple

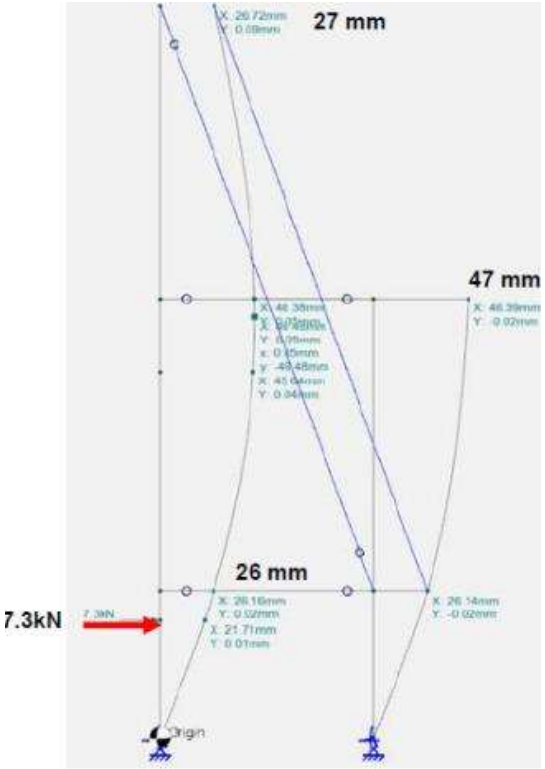
Minimum Performance Criteria

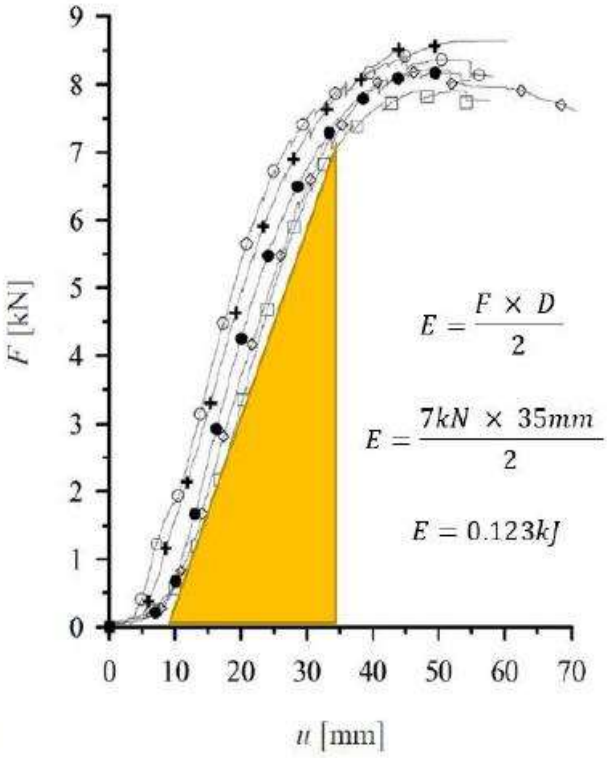
- Contain or redirect a worst-case snapback
- Avoid hazardous debris
- Minimize movement of the arresting system to prevent hazards.
- Protect large areas from unpredictable events in unexpected locations.

Holmes


Holmes

Conventional Design





The engineering theory


RIVA VOLI
RIVA VOLI
Holmes
Holmes

Operational Requirements

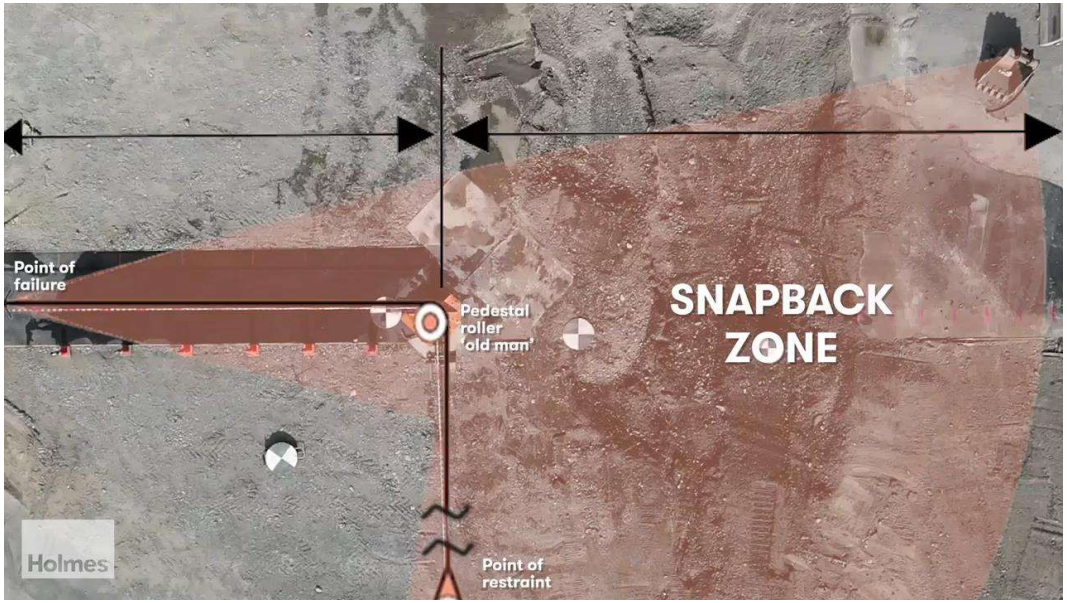
- Maintain high visibility for personnel during mooring operations.
- Limited footprint and existing structural capacity for the arresting structure.
- Minimize operational downtime with short installation windows.
- Restricted access for heavy equipment at installation locations.
- Harsh metocean conditions: high winds, extreme UV, and saltwater exposure.

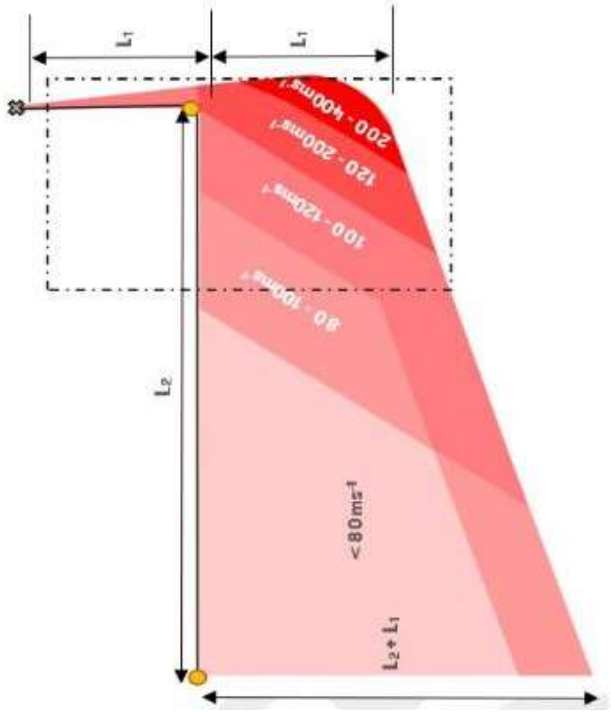
Holmes

An alternative approach to design

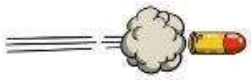
Understanding snapback impact severity

Extreme speeds
small impact areas





Faster than a **speeding bullet?**



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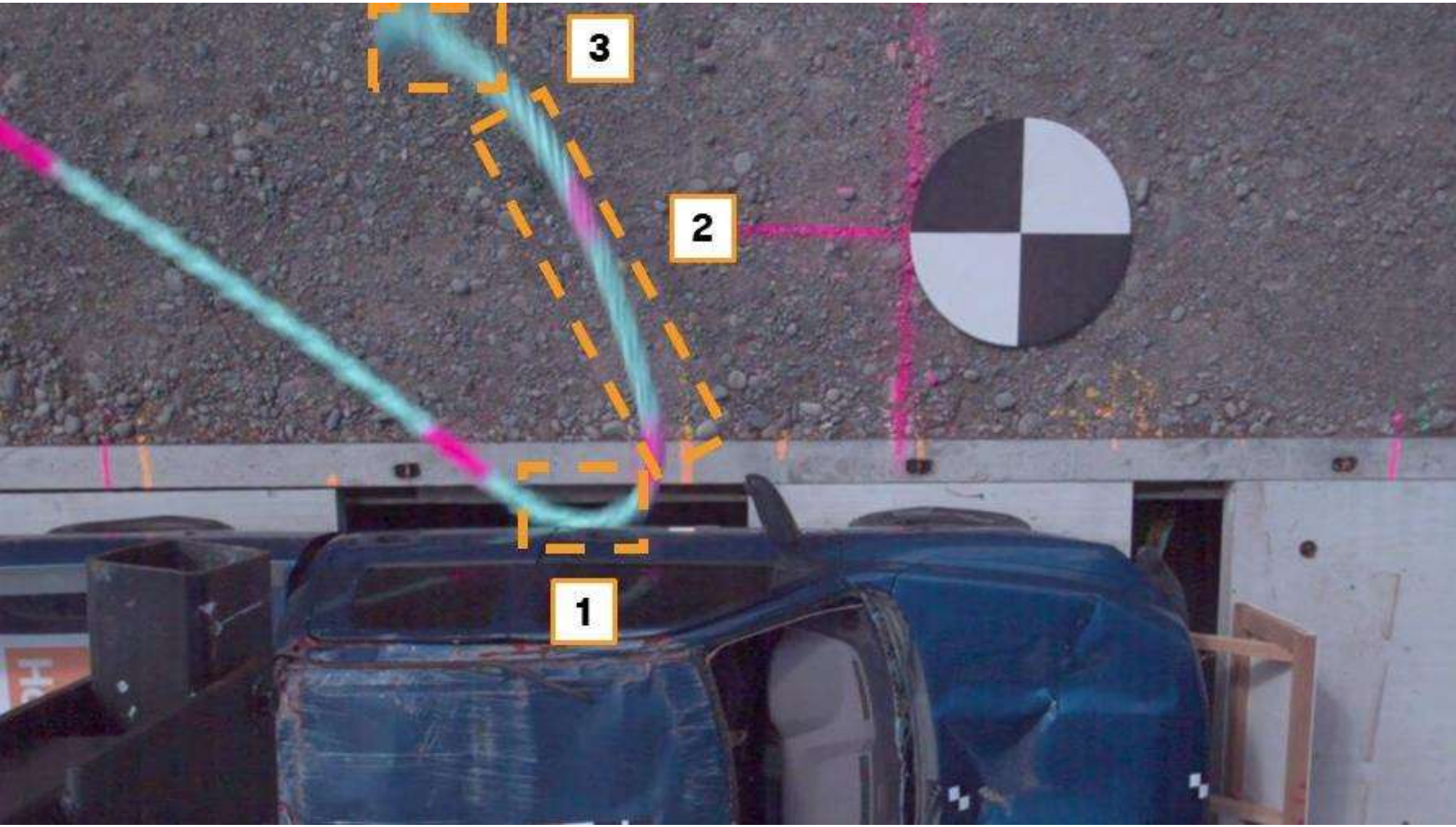
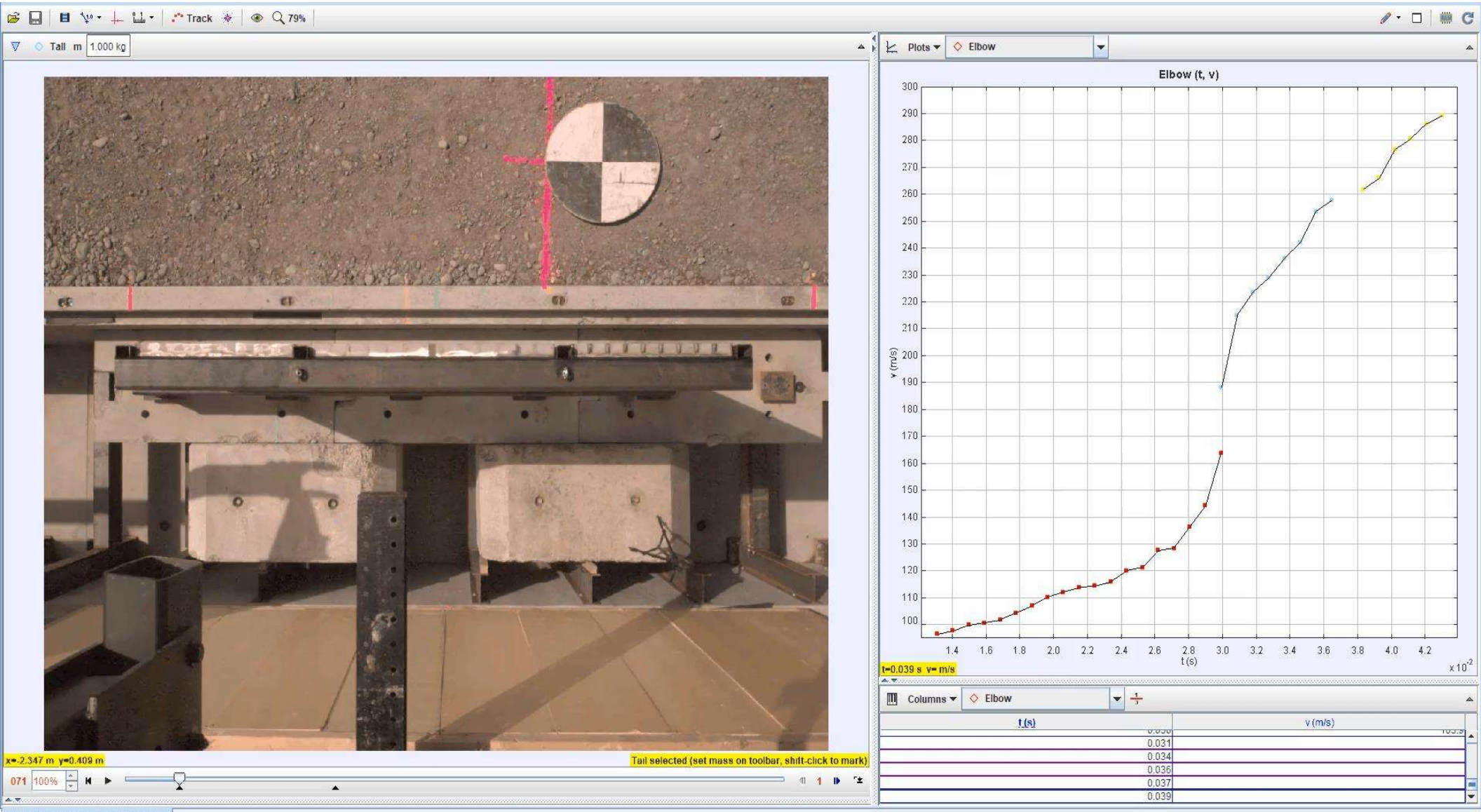
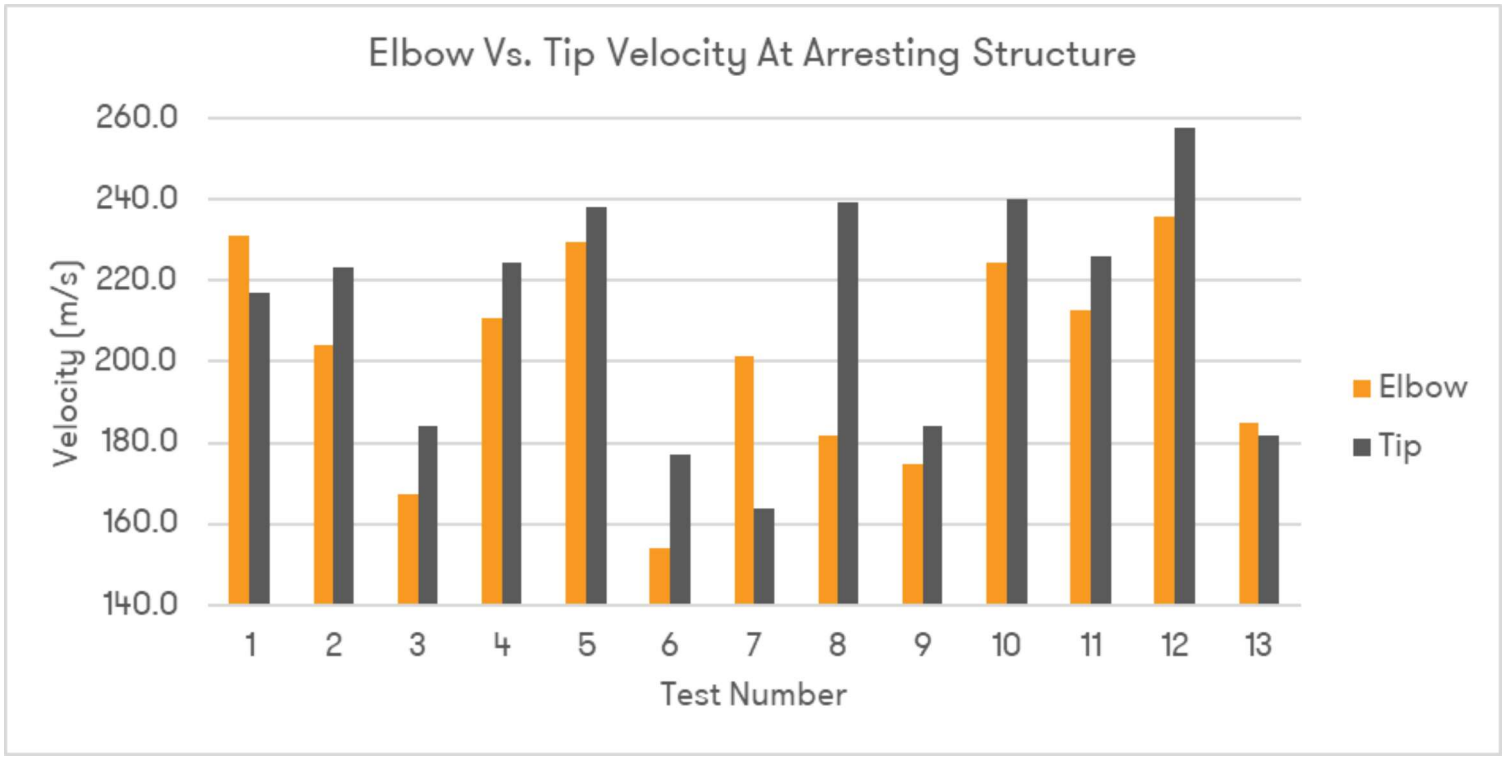
3
3

Distinct loading events

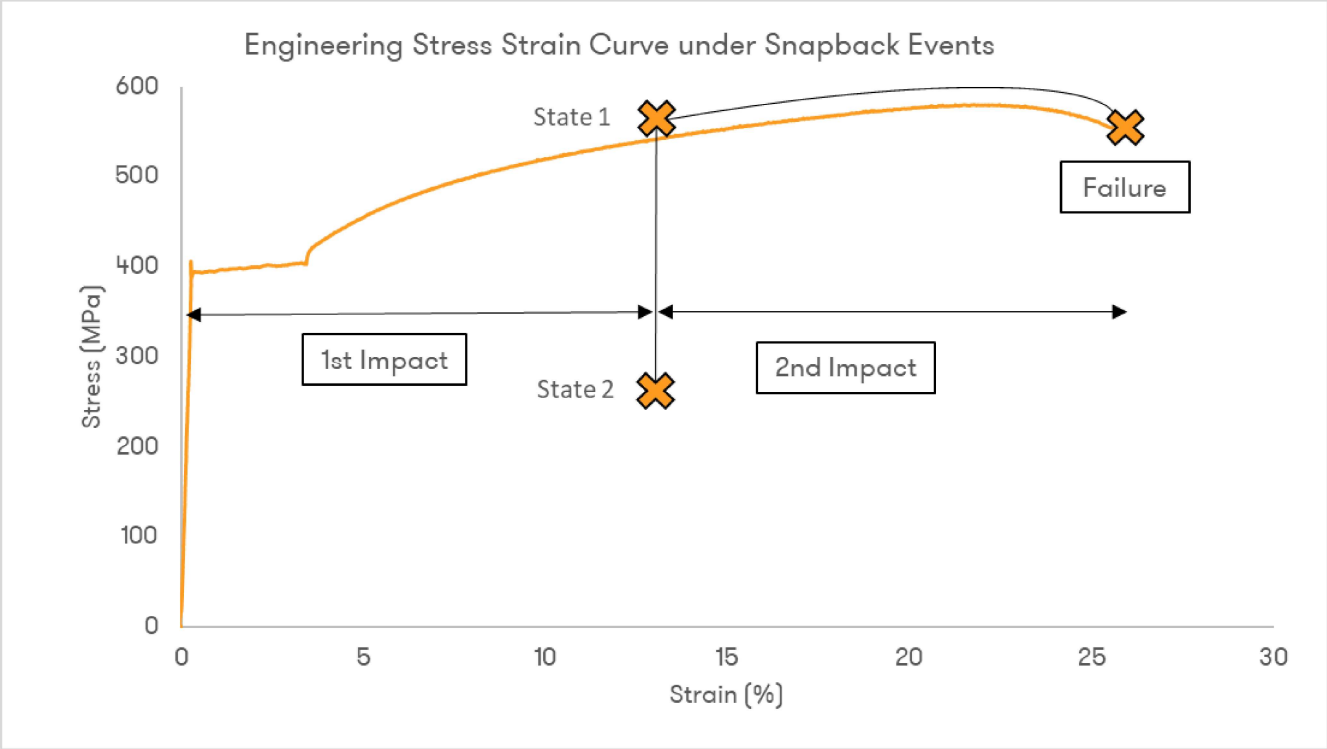

3
2
1

Velocity of each critical impact event


Track
79%
Tall m 1.000 kg
x=-2.347 m y=0.409 m
Tail selected (set mass on toolbar, shift-click to mark)
071 100%
Plots
Elbow
Elbow (t, v)
v (m/s)
t (s)
x 10^-2
t=0.039 s v= m/s
Columns
Elbow
t (s)
v (m/s)
0.031
0.034
0.036
0.037
0.039
#2B-2 B Close Overhead HS JDR.trk



Duration between critical impact events



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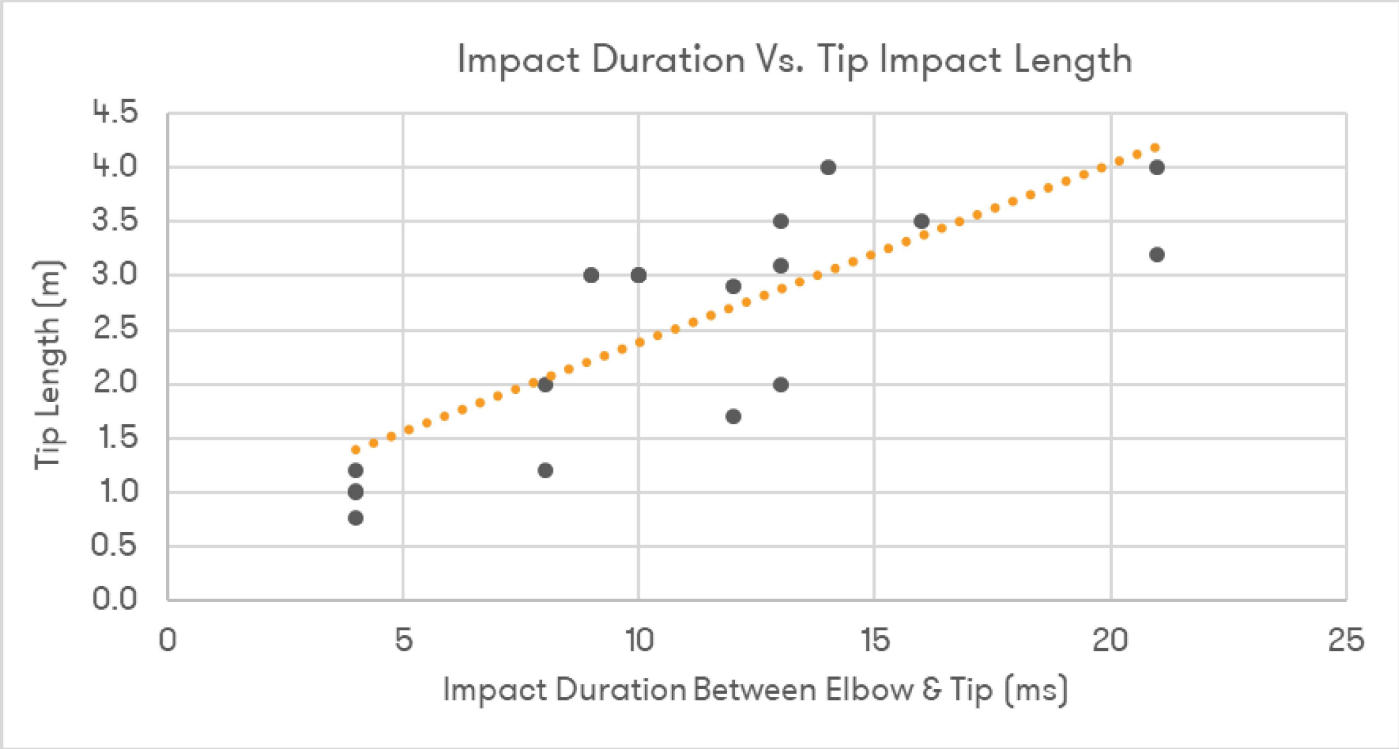
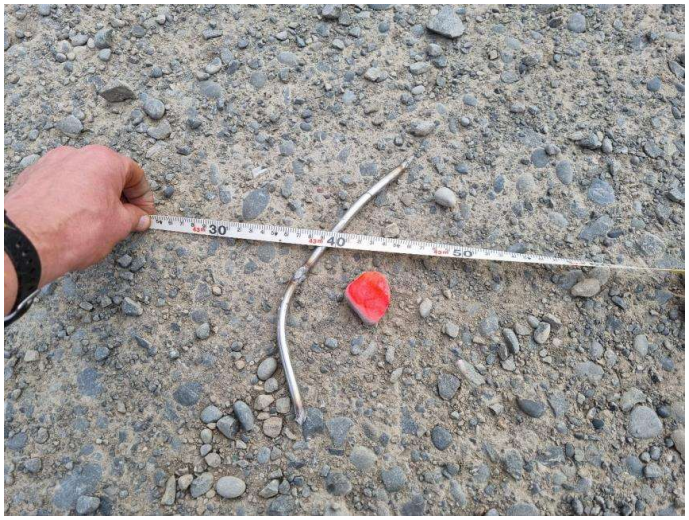


Holmes


Holmes



Debris Code	Max Velocity (m/s)	Weight (g)	Max Energy (J)
1	57.7	53	88.3
2	152.5	46	534.9
3	143.7	52	536.9
4	76.6	38.5	113.0
5	110.5	101.5	619.7
6	67.7	46.0	105.5
.22LR Projectile	330.0	2.6	163.0

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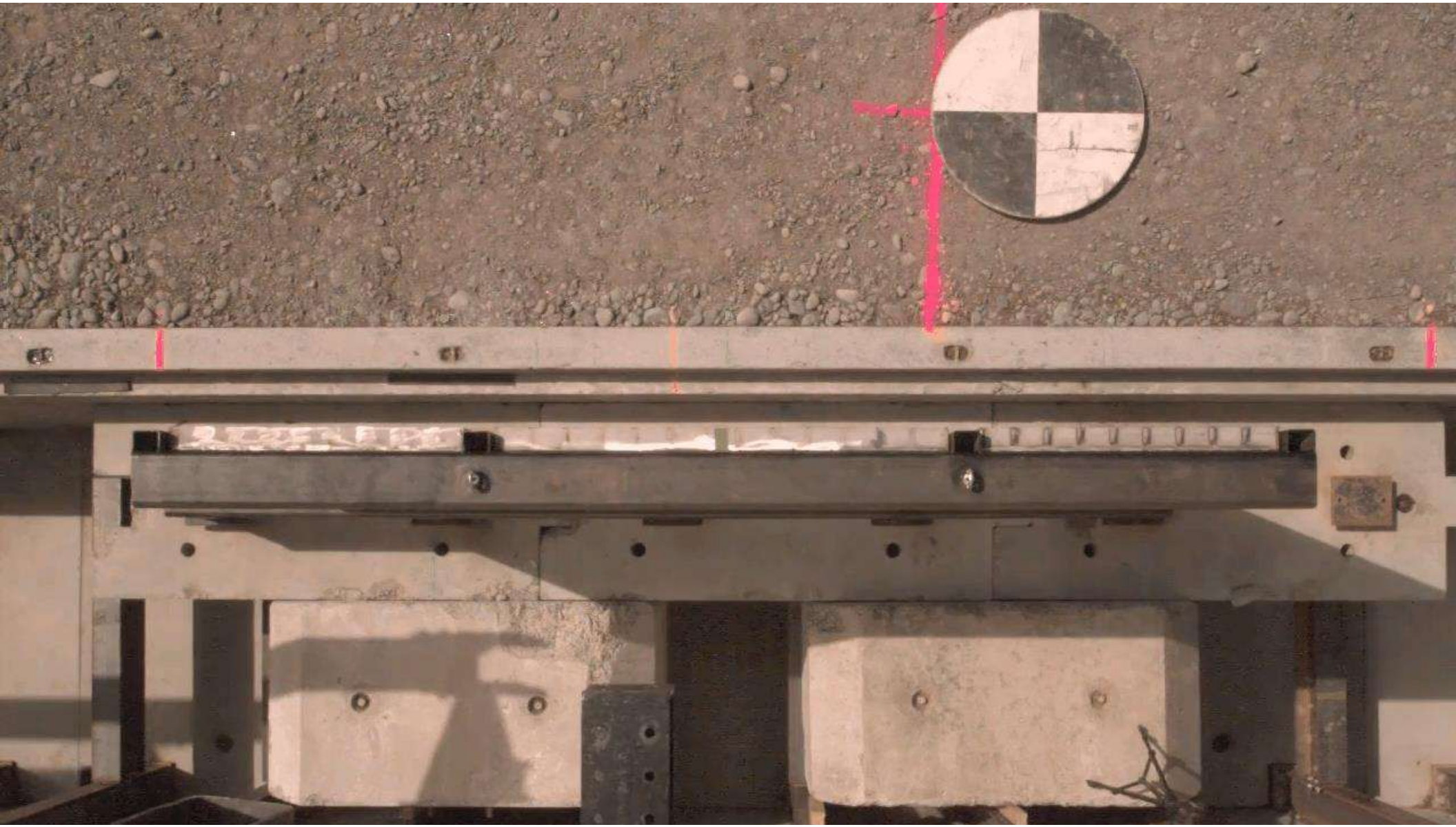
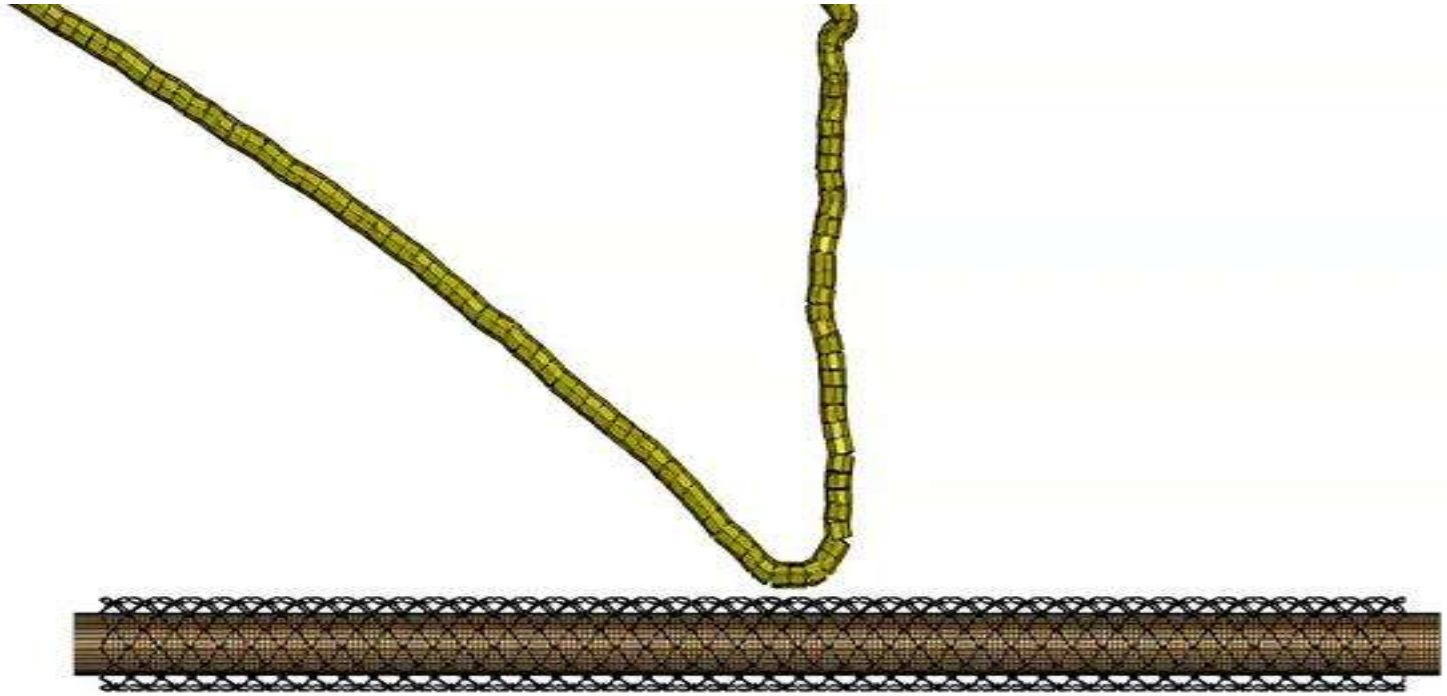
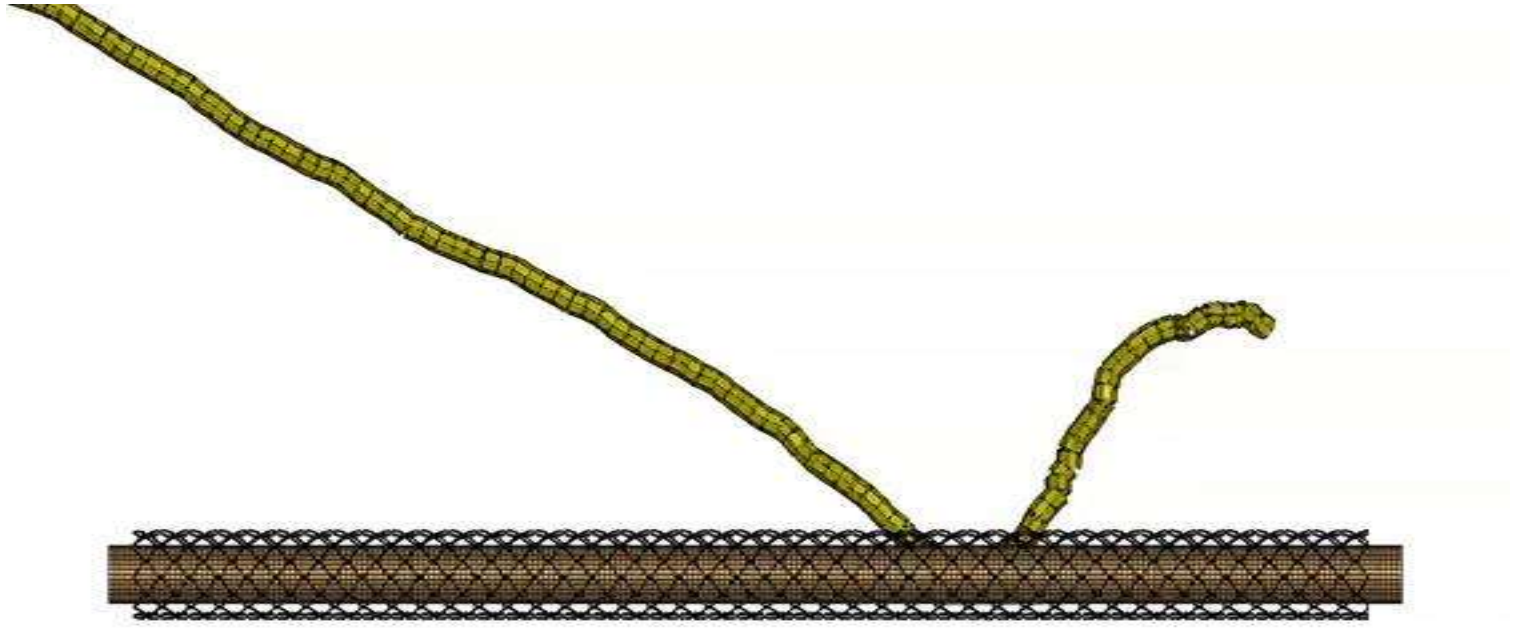
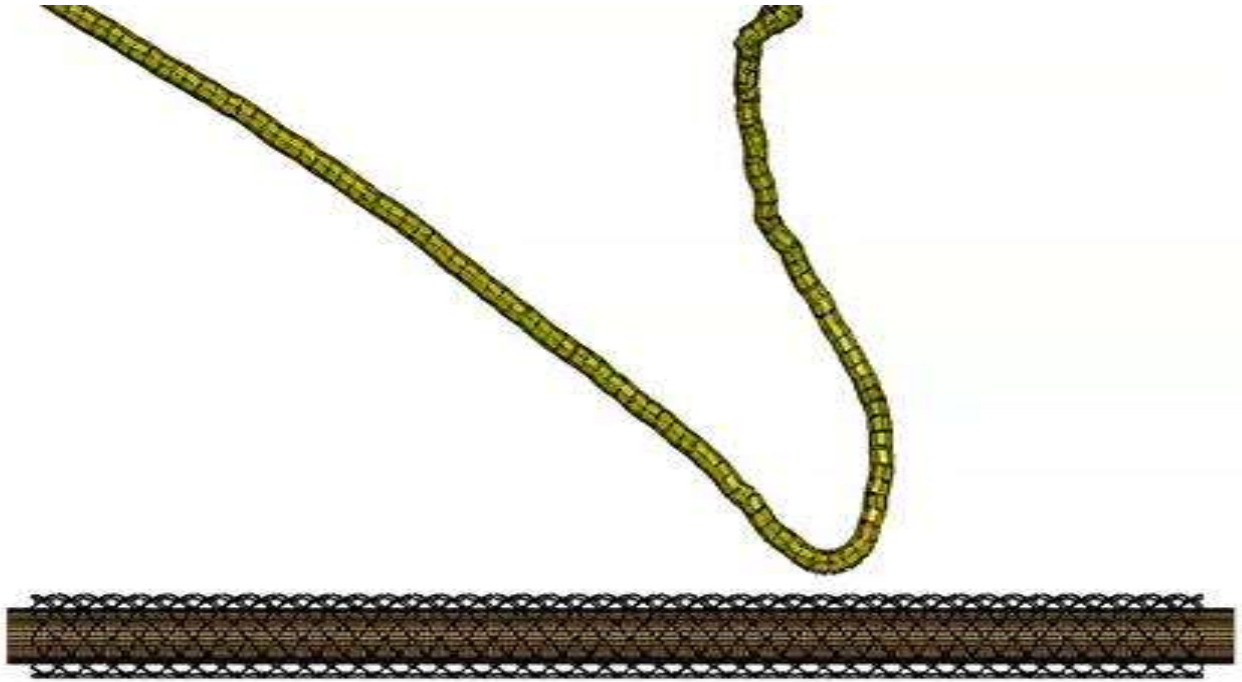
Position of critical impact events










RAM
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Conclusion

Geobrugg Snapback Arresting Structure - Hay Point 2023

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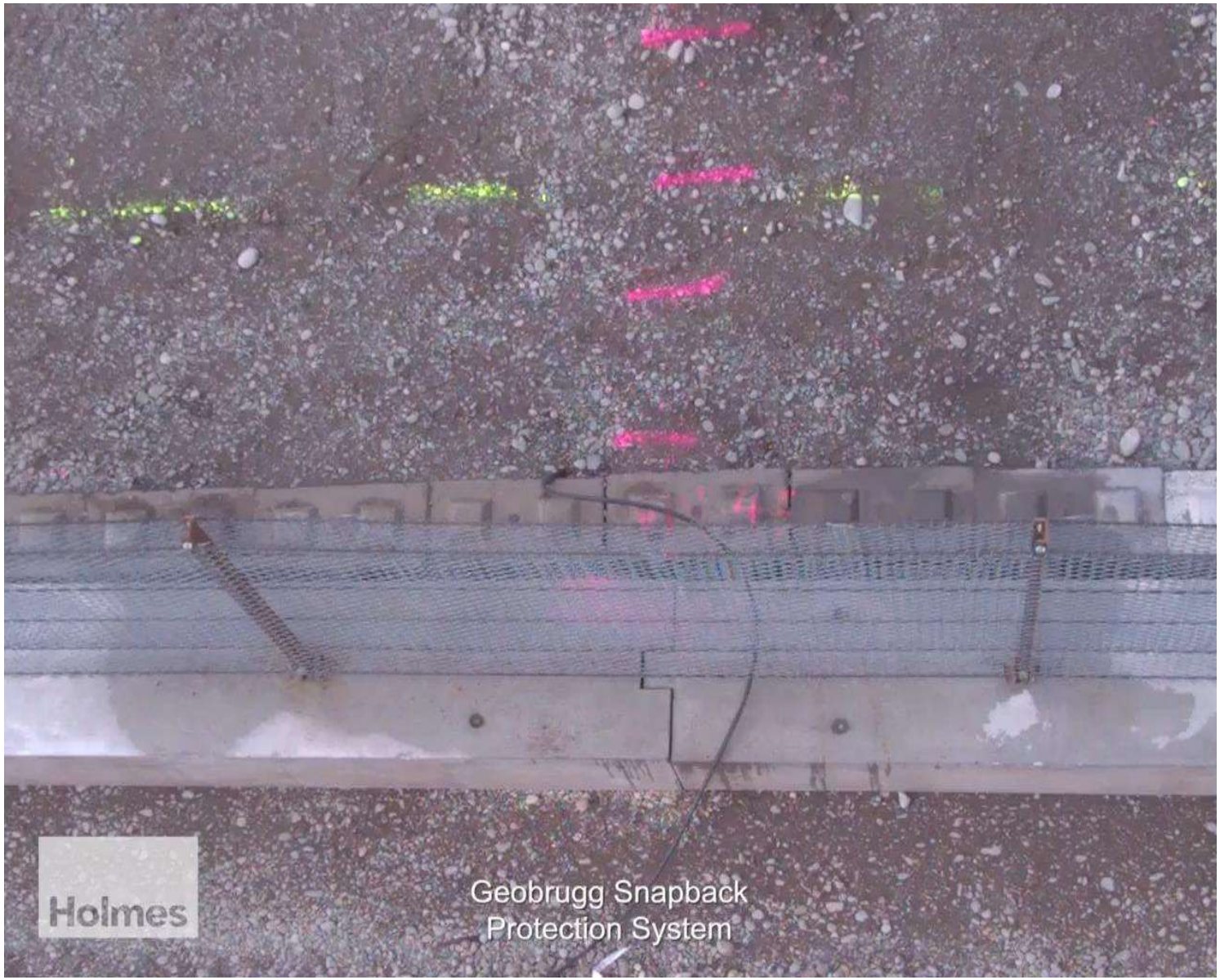
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Geobrugg Snapback
Protection System


Holmes
Geobrugg Snapback
Protection System

Geobrugg Temporary Snapback
Protection Structure

Any Questions?


Caps
A
S
Shift
Z
X
Ctrl
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