Brake Only Snag System

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Felixstowe Crane

Types of Overloads

- Slow
  - STALL
  - Predictable
- Fast
  - SNAG
  - Unpredictable

History of Snags

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- Turning Sheave Failed
- Main Hoist Drum Mount Failure
- Crane Jumping

History of Snags

Hydraulic Systems

Safety Coupling Systems

Current Main Hoist Brakes

Current Main Hoist Brakes

- 11 liters of fluid
- Set time 320msec to first pad contact
- Time to full brake torque 420msec

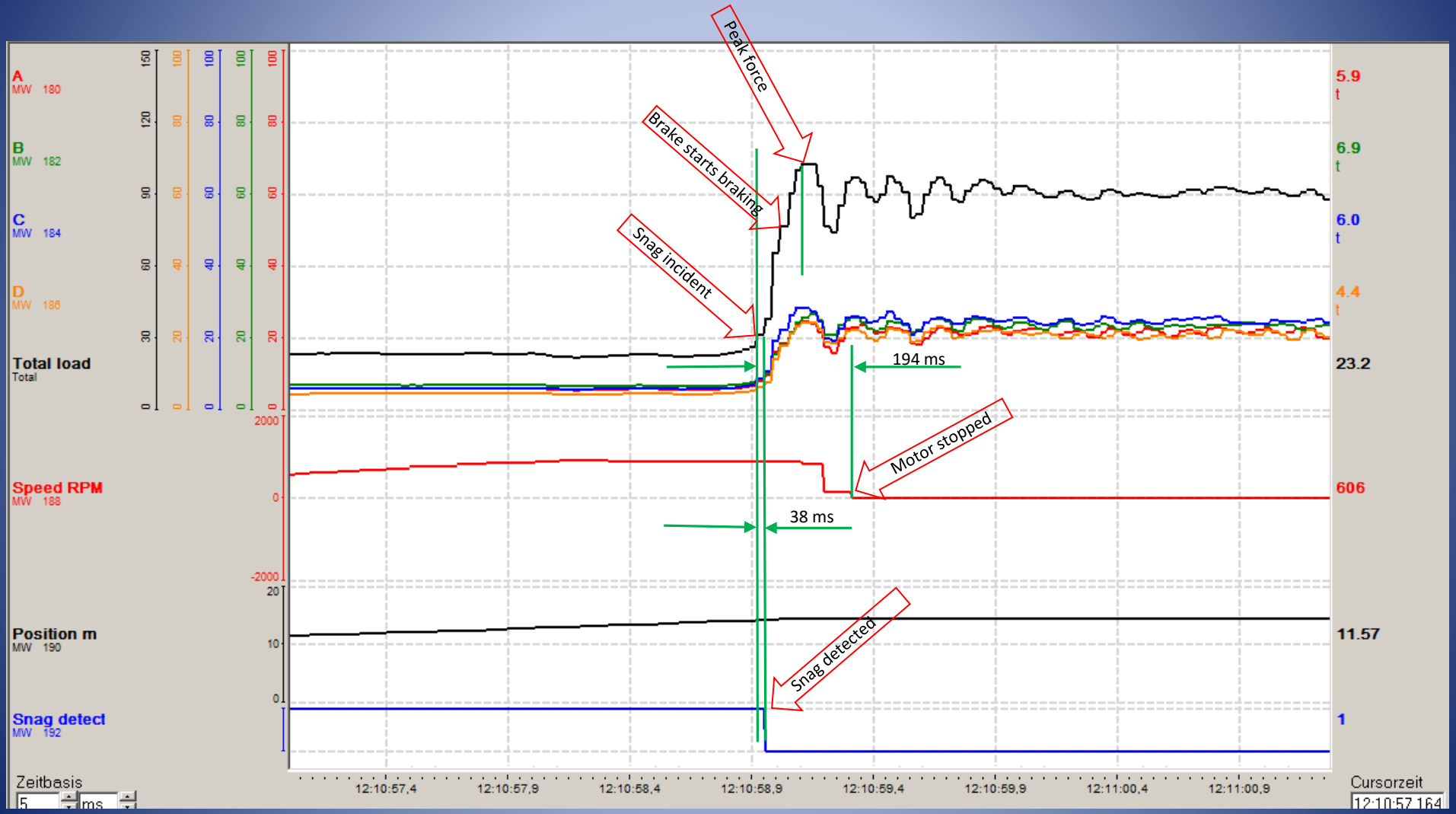
Proof Test Main Hoist Brakes

Proof Test Main Hoist Brakes

- Typical brake with Buell thruster
- 1/2 liter of fluid
- Set time restricted by internal force on brake components
- Set time 80msec to first pad contact
- Time to full brake torque 100msec
- Brake Control System

Proof Test

Proof Test


Peak force
Brake starts braking
Snag incident
194 ms
Motor stopped
38 ms
Snag detected
A
MW 180
B
MW 182
C
MW 184
D
MW 186
Total load
Total
Speed RPM
MW 188
Position m
MW 190
Snag detect
MW 192
5.9
t
6.9
t
6.0
t
4.4
t
23.2
606
11.57
1
Zeitbasis
5
ms
12:10:57,4
12:10:57,9
12:10:58,4
12:10:58,9
12:10:59,4
12:10:59,9
12:11:00,4
12:11:00,9
Cursorzeit
12:10:57,164

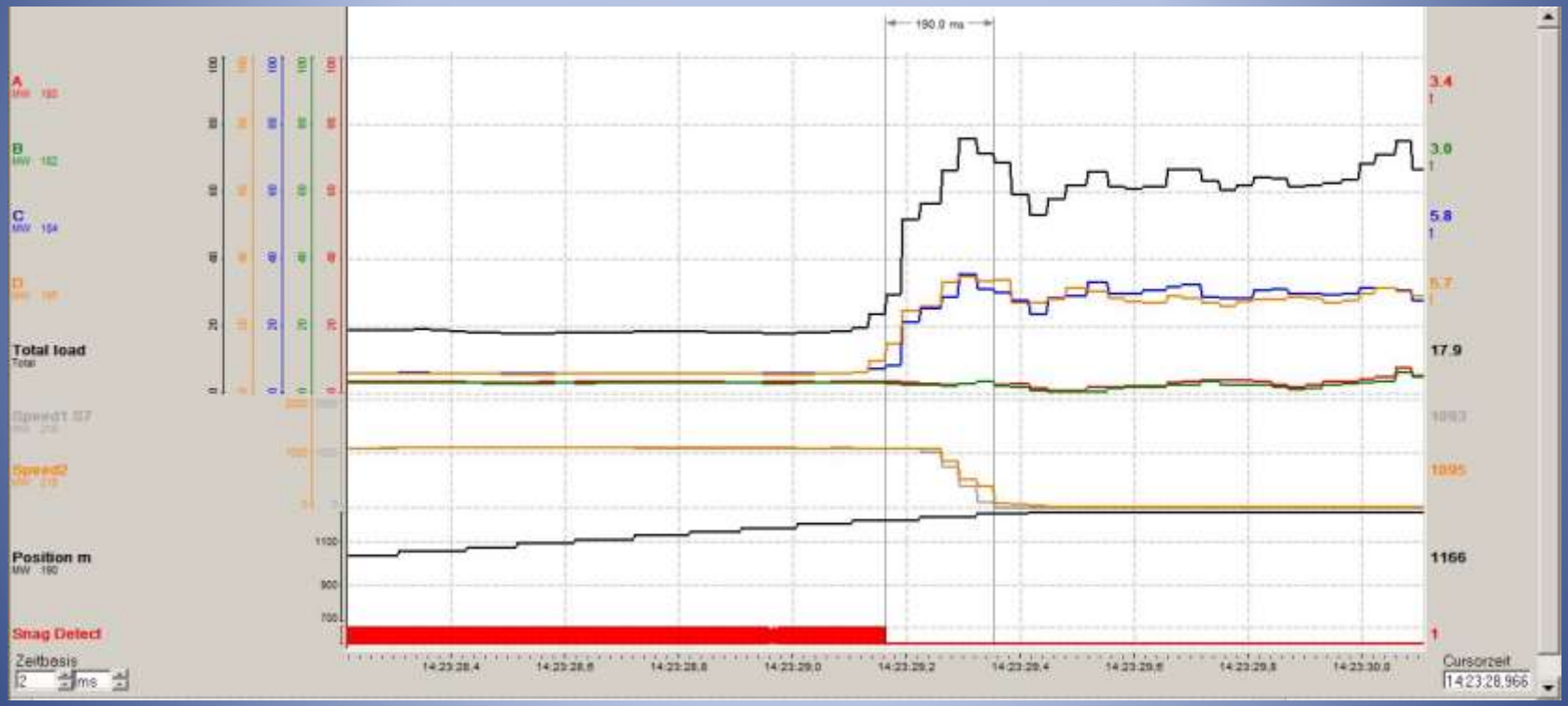
Fast Setting Brakes

Fast Setting Brakes

- 1/2 liter of fluid
- Set time 36 msec to pad contact
- Set time to full brake torque 46 msec
- Brake components strengthened
- Brake torque not increased

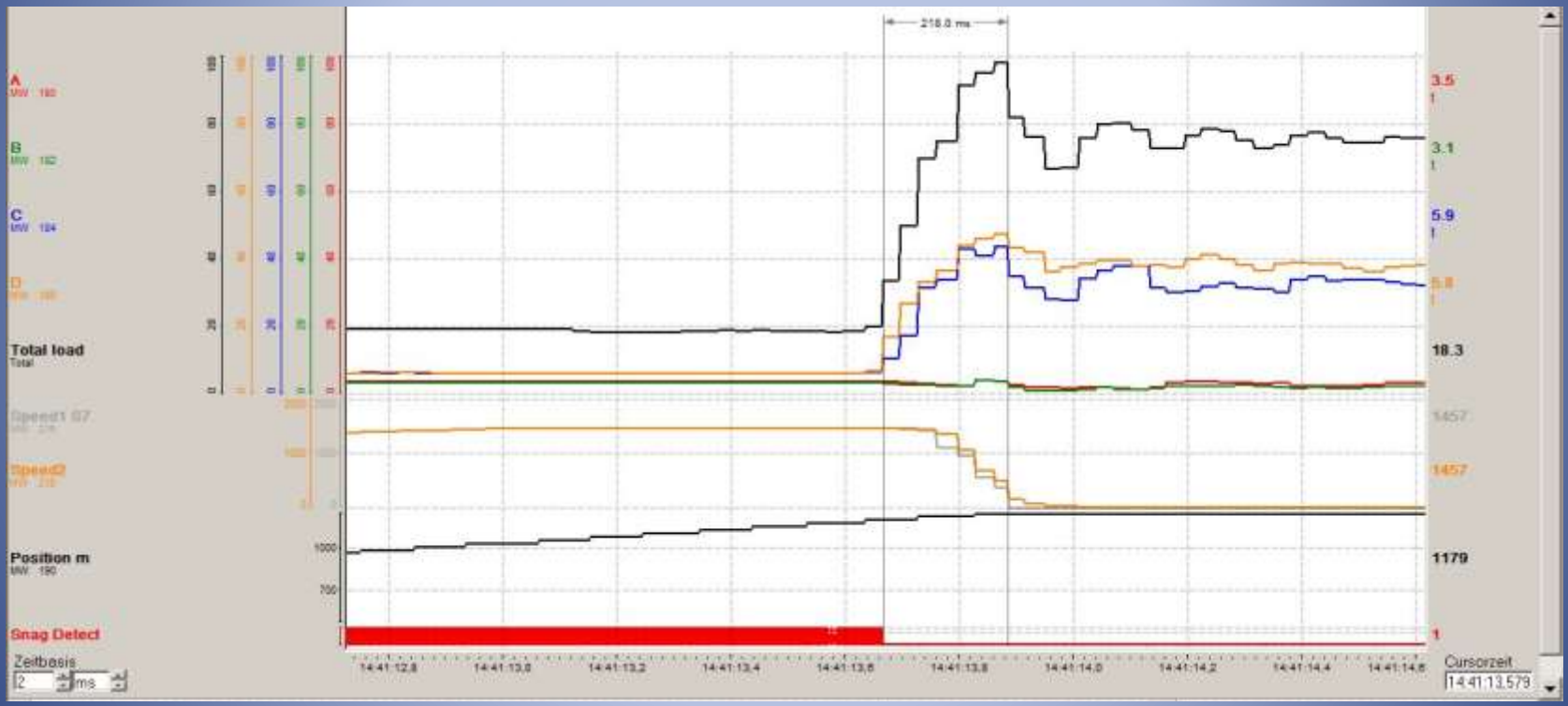
High Speed Test

High Speed Test



High Speed Test

High Speed Test



Operational Advantages

- Snag event like any other overload
- No downtime waiting for reset by maintenance staff
- Works with any TLS system
- Only brakes inside machinery house to maintain
- No nuisance trips during operations or E-stops
- No hydraulic pumps, fluid reservoirs, cylinders or piping

The End

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