Case Study of the Active 70 Cable Yarder in New Zealand

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CHRISTCHURCH NEW ZEALAND

Commercial Forestry in NZ

- Exclusively monoculture plantation
- Harvest age 28
- Clear cut, size unlimited
- Whole tree extraction dominant
- Stocking 350 – 650 stems/ha
- Standard volume of 650 tons/ha

- Cable yarder use increasing significantly

  15% in 1976 to 40% in 2014
- Average harvest costs

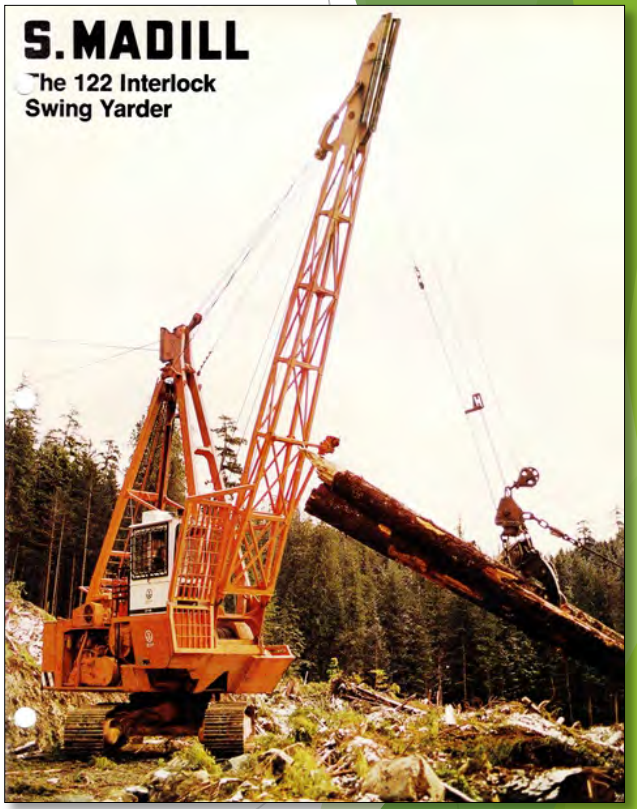
  $26.90/t ground based, $35.90/t yarder based

Cable yarding in New Zealand

- Typical machinery
- Pacific Northwest origins or modified versions
- Generally from the1970-1980’s

- Large heavy machinery
- 45 - 70 tons
- 300 - 450kw

- Modern adaption of these machines common
- Limited difference from base models
- Often necessary repairs not upgrades



Generally working fine – however

- To be competitive internationally our systems need to continue to adapt and advance.
- Forest areas exist that are uneconomic to harvest. New methods might resolve this issue.
- Increase safety of workers, ideally without reducing productivity

Solution – Adoption of new systems and technology.

New machinery on the scene

- Domestic and international options

Active 70 yarder
(Rotorua, NZ)

By Active Machinery LTD

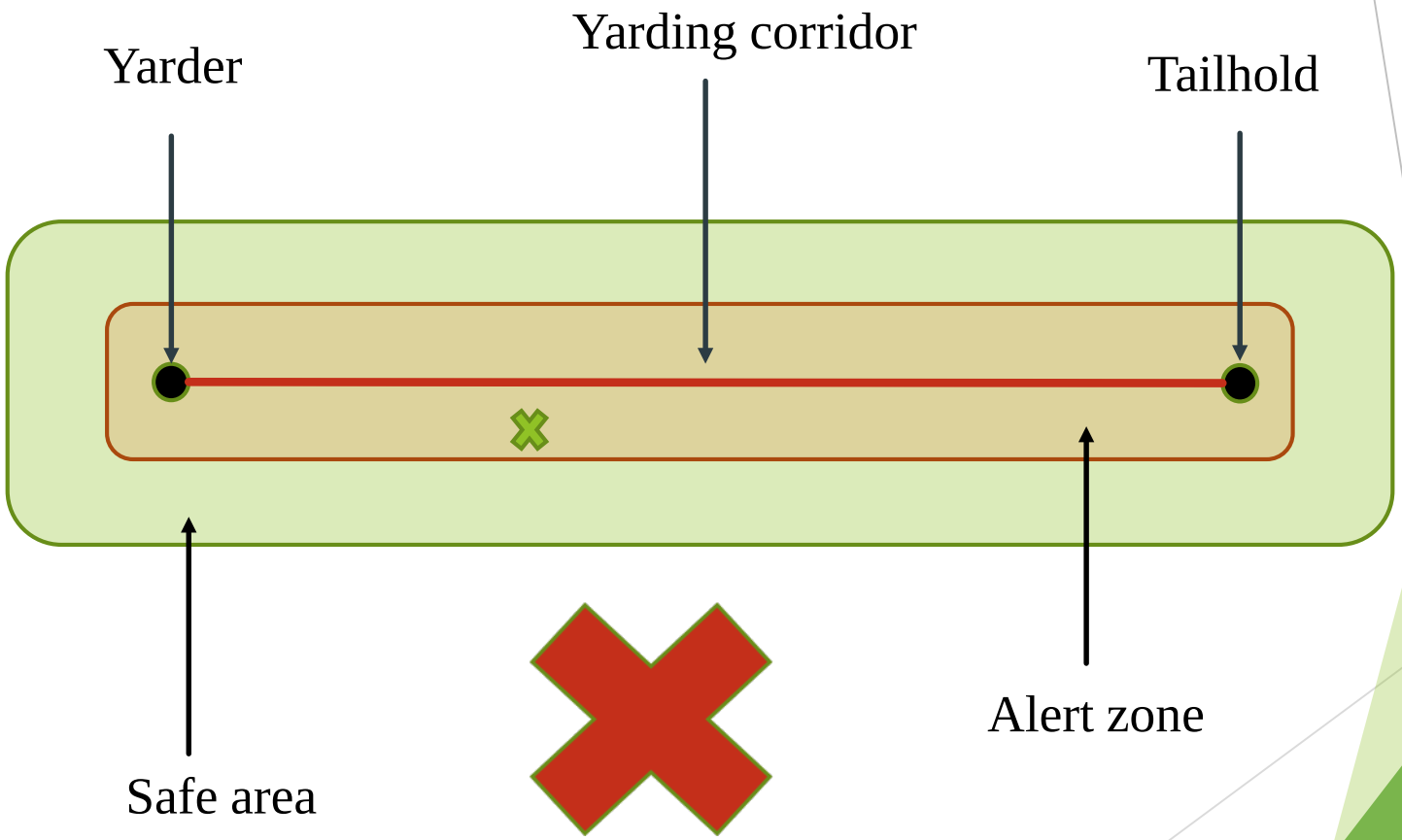
Koller 602H
(Kufstein, Austria)

By Koller Forsttechnik

Active 70 Yarder	Koller 602H
21m tower,350 kw, 45 tons	12m, 147kW, 15 tons

Features	Active	Koller
Skyline and mainline tension and distance monitoring	✚	✚
Modern turbo diesel engine	✚	✚
Automated carriage control		✚
Full remote control operation		✚
Real time display of GPS tracking of choker-setters	✚	
Highly simplified, ergonomic drivers cab	✚	
Terrain tracking technology	✚	

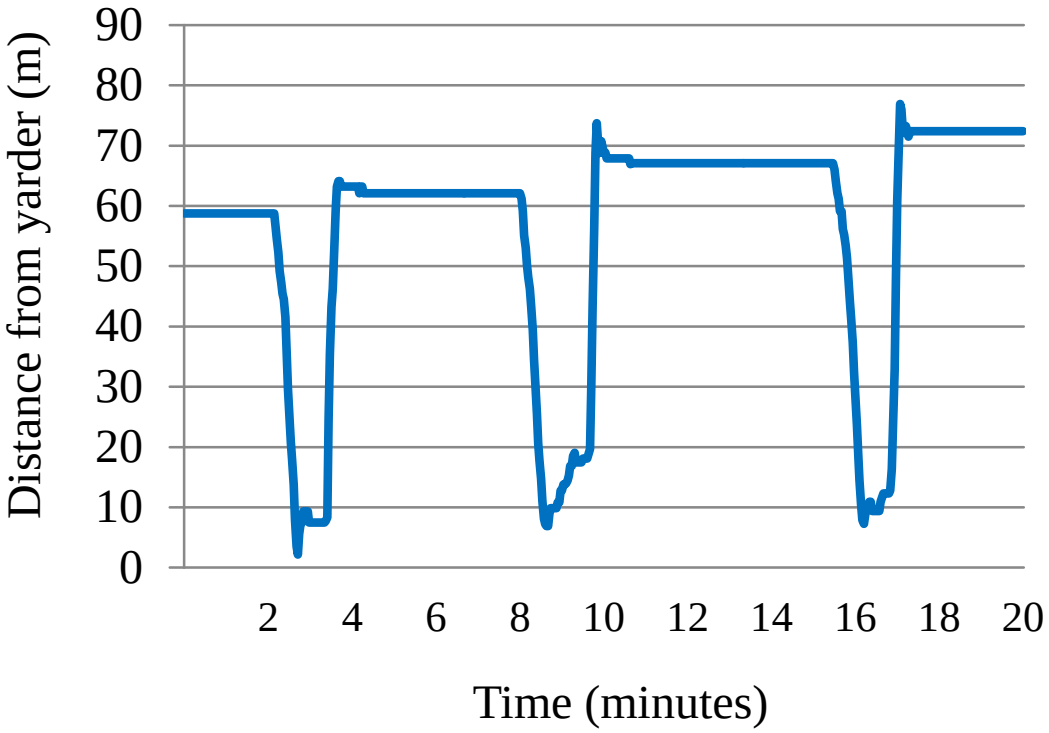
GPS tracking - AcDat system



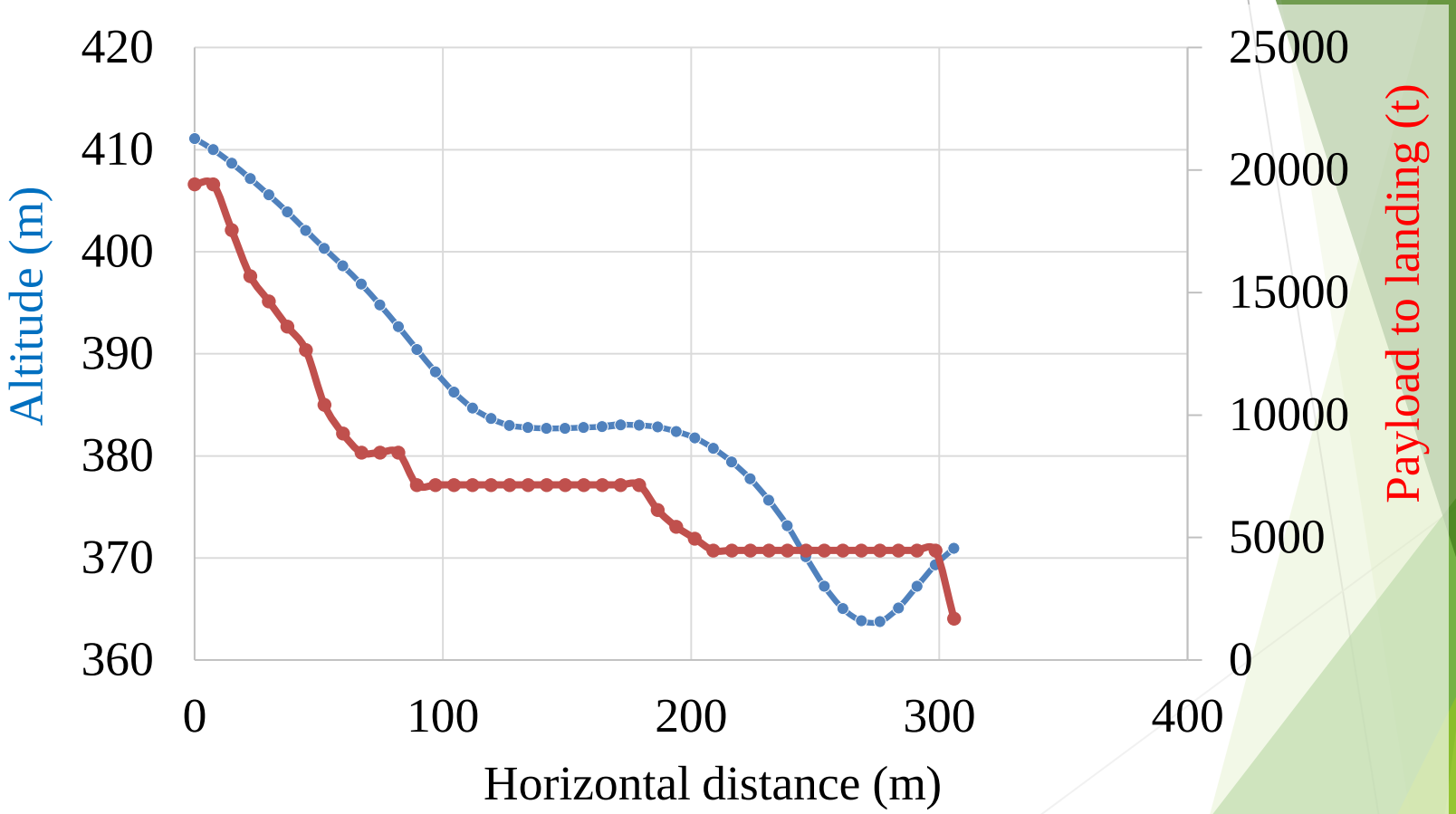
Study design

- Productivity assessment
  - Manual and GPS tracking time study
  - Haul volume estimates
- Assessment of choker setter work levels
  - Heart rate analysis
- Noise assessment.
  - Decibel meter
- Assessment of features
  - Observation and measurement.

Study data examples – Time study through GPS tracking



Study data examples - CHPS application



Productivity:

- 5 days, 175 cycles, 5 corridors

- Average piece size 1.1 t (0.3 – 2.0t)
- Extraction distance 140m (40 – 280m)
- Deflection

- Utilization rate 65%
- 15.3 t/SMH
- 24.3 t/PMH

- Overall difficult site: steep area → hard for choker-setters, low deflection → poor payload

Effect of Deflection

- Range between 2 – 8%
- Corridors with more deflection had larger turn volumes

  2.7 m^3/turn at 2% deflection

  4.6 m^3/turn at 7% deflection

This caused large differences in productivity between corridors

13.3t/SMH at 2% deflection

23.4t/SMH at 7% deflection

Heart rate monitoring

Indices	Average	High work rate
Relative heart rate at work	31.5 %	> 30%
50% of working heart rate	0.97	> 1.00
Ratio of resting to active	1.56	> 1.2

- Slight discrepancies in work level
- All indices indicate hard continuous work

- Indicates implications for fatigue related issues

Health and safety benefits

- Tension monitors
- Assessment of working loads in difficult areas

- GPS worker tracking
- Remove miscommunications, no line of sight issues

- Quiet engine
- 10 meter radius volume below 80 Db
- Minimal risk of hearing damage at a 10 meter distance

Definite improvement

Conclusion

Active 70 yarder productivity study complete

Koller 602 study still to come

New generation machines bring opportunities for the New Zealand forestry industry.