PLC Industry Development Committee

Workshop: Utilization in Mechanized Logging

Presenters

Hunter Harrill, John Garland, JR Hendershott, Ryer Becker

Pacific Logging Congress, Tucson, AZ, 2026

Workshop Outline

1 | JOHN GARLAND

5 B's of Mechanized Logging

Importance of Communication & Cross-training

2 | JR HENDERSHOTT

Machine Idle Time: Cost vs Reward

How to measure and reduce idle time

3 | RYER BECKER

Training & Workforce Development

Approaches to training and impacts on production

4 | HUNTER HARRILL

Operational & Mechanical Delays

Effects on productivity & job site experiences

5 | MATERIALS & TOOLS

Resources & How to Use Them

- Video: Tackling Productivity
- Handout: The 5 B's of Mechanized Logging
- Handout: Production Control Chart
- Handout: Cycle Time VS Payload Chart
- Handout: Cross-training Roster

What is utilization?

“How productive we are with our use of time and machinery”

Often measured by our Utilization Rate (UR%)

Productive Machine Hours (PMH)

PMH = SMH - Delays

SMH = Scheduled Machine Hours
Delays = Mechanical, Operational & Personal

Utilization Rate Formula

UR% = (PMH / SMH) × 100

Ratio of productive time to total scheduled time

Old School Knowledge

“Tackling Productivity in Mechanized Logging”

OSU Video Training Program on Productivity Improvement

Dr. John J. Garland, PE

Emeritus Professor, Timber Harvesting Extension Specialist & Consultant
Oregon State University

Link to video

Pacific Logging Congress, Tucson, AZ, 2026



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Basis for Improvements: The 5 B's of Mechanized Logging



Bottlenecks — A process or machine that slows down the production of the entire crew



Balance — The flow of wood from one process or machine to another



Buffers — A stock pile of material in between processes so that if one stops the other can continue working



Breakdowns — Mechanical repairs, especially ones that can be prevented by routine maintenance and respecting limits of the machinery



Blunders!!! — Mistakes that lead to downtime or lost production

Why Principle Based Education?

Core Continuity
Principles transcend time, space & technologies

Equipment Evolution
1989 logging equipment has direct parallels today

Predictable Dynamics
Human behaviors remarkably constant & predictable

Applied Training
Video part of designed workshops on productivity in mechanized operations

TIMELINE OF MECHANIZED OPERATIONS



Workshop Strategy For Your Operation

1. View the Video Together
Watch as a team to establish a shared starting baseline

2. Hold Open Discussion
Address frustration and get over initial “gripes”

3. Identify Solvable Problem
Pinpoint a specific challenge the crew can directly solve

4. Tackle the Problem
Focus crew energy on immediate targeted action

5. Get Information & Execute
Follow-through implementation & workflow:

- Further specify the problem
- Communicate to crew & involved staff
- Develop solutions using the 5 B’s
- Try one solution & evaluate results

Forestry Equipment

Machine Idle Time: Cost vs Reward

JR Hendershott
Manager of Forest Products & Development
Peterson CAT

Pacific Logging Congress, Tucson, AZ, 2026


#568 Forestry Excavator
568-07LL (2022) - CAT - SYT00182
10,009.6 Hours
10/01/2026; 04:30 PDT
2512 9th St, Tillamook, OR 97141, USA
10/01/2026; 04:30 PDT
Shop Parts
Overview
Needs Review
Safety
Health
Planned Maintenance
Service
Timeline
Utilization
Asset Operation
Agreements
Toolkit
Map
ECM/Telematics
File Storage
Last 7 Days (09/25/2026 - 10/01/2026)
85.6 Hours
Total Runtime
15 Hours
Total Idle Time
18 %
Percent Idle Time
352 gal
Total Fuel Burned
7,814.4 lb
Total CO2 Emissions
Runtime by Date
Show
Reference Lines
40
20
0
Total Runtime (Hours)
09/25/2026
09/26/2026
09/27/2026
09/28/2026
09/29/2026
09/30/2026
10/01/2026
Date
Runtime
Working Time
Idle Time
Target Indicators
1 - 7 of 7
Date
Hour Meter
Idle Meter (Hours)
Runtime (Hours)
Idle Time (Hours)
Working Time (Hours)
Idle %
Working %
Total Fuel Burned (gal)
Total Fuel Burn Rate (gal/Hour)
10/01/2026 10,009.6 2,006.7 5.5 1.6 3.9 29% 71% 21.9 3.9
09/30/2026 10,004.0 2,005.1 20.0 3.5 16.5 18% 82% 80.8 4.0


Overview
Needs Review
Safety
Health
Planned Maintenance
Service
Timeline
Utilization
Asset Operation
Agreements
Toolkit
Map
ECM/Telematics
4
Previous Month (09/01/2026 - 09/30/2026)
134.3 Hours
Total Runtime
33.1 Hours
Total Idle Time
25 %
Percent Idle Time
898 gal
Total Fuel Burned
19,946.7 lb
Total CO2 Emissions
Runtime by Date
Show
Reference Lines
Total Runtime (Hours)
20
10
0
09/01/2026
09/03/2026
09/05/2026
09/07/2026
09/09/2026
09/11/2026
09/13/2026
09/15/2026
09/17/2026
09/19/2026
09/21/2026
09/23/2026
09/25/2026
09/27/2026
09/29/2026
Date
Runtime
Working Time
Idle Time


Overview
Needs Review
Safety
Health
Planned Maintenance
Service
Timeline
Utilization
Asset Operation
Agreements
Toolkit
Map
ECM/Telematics
File Storage
57.3 Hours
Total Runtime
29.1 Hours
Total Idle Time
51 %
Percent Idle Time
177 gal
Total Fuel Burned
3,934.9 lb
Total CO2 Emissions
Runtime by Date
Total Runtime (Hours)
20
10
0
10/19/2026
10/20/2026
10/21/2026
10/22/2026
10/23/2026
10/24/2026
Date
Runtime
Working Time
Idle Time
Target Indicators
1 - 7 of 7
Date
Hour Meter
Idle Meter (Hours)
Runtime (Hours)
Idle Time (Hours)
Working Time (Hours)
Idle %
Working %
Total Fuel Burned (gal)
10/25/2026
10/24/2026 7,741.6 3,432.0 0 0 0 — — 0 —
10/23/2026 7,741.6 3,432.0 11.7 ▲ 6.1 5.7 ▲ 52% 48% 38.4 3.3

How Much Does Idle Time Cost Me?

Rough math based on a 10,000-hour machine life cycle at 30% idle time (3,000 idle hours)

Depreciation

$150,000

3,000 Idle Hours × $50 / Hr

Fuel Cost

$6,000

1,500 Gallons burned (0.5 g/h @ $4.00)

Additional Hidden Costs

- 12 Additional 250-Hour Maintenance Services
- Significantly Shortened DPF Core Life

What Can You Do About It?

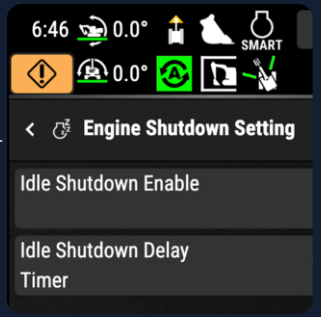
Idle Time - What Can We Do About It?

Solutions for idle reduction and maintaining operator comfort

Engine Idle Shutdown

10-Minute Timer

Offered by CAT, John Deere, Link-Belt & many other OEMs.



Operator Comfort & Power

Dual Batteries Offer Extended Systems Use

Run auxiliary equipment without keeping the engine running:

- Radio & Communication
- Phone Charging
- Auxiliary & Work Lighting

Cabin Heating Solutions

Webasto Coolant Heaters (Fuel Fired)

- Pre-heats machine engine in the AM
- Keeps operator warm when machine is off

Webasto Air Exchangers (Air Top 2000)

- Dedicated cab heat solution



What Can You Do About It?

Actionable steps to reduce idle time while keeping operators productive

Reality

- Understand That It Is a Cost Of Doing Business
- A Comfortable Operator Is a Productive Operator

There Is Something You Can Do. Consider This:

Better

20%

Depreciation + Fuel
$104,000

Best

15%

Depreciation + Fuel
$78,000

Superstar!

10%

Depreciation + Fuel
$52,000

Idle Time - What Can We Do About It?

Summertime operator comfort and the true cost of machine idling

What About Summertime?

How Do We Keep The Operator Cool?

- **No Cost-Effective Solutions:** Off-engine cooling solutions remain limited or cost-prohibitive.
- **Electrical Draw:** Running fan only requires high draw on the electrical system.

Bottom Line:

Idle the machine! Keep your operator happy and safe during the summer and winter months. Work on idle time reduction during the fall and spring times.

The Cost of Idling

"Idling is hard on the emissions system & my pocketbook..." True, but consider this:

10,000 Hour Machine

Every 1% Improvement = $5,000 Depreciation
Every 1% Improvement = $$200 Fuel
Every 2.5% Improvement = One Less 250 Hr Service

Every Little Improvement Increases Profit!

Questions?

Thank You!

Forest Operations Extension

How do we approach training and workforce development?

Mitigating training impacts on utilization and production

Dr. Ryer M. Becker

Forest Operations Extension Specialist

University of Idaho

Pacific Logging Congress, Tucson, AZ, 2026

Workforce Engagement and Training

"How do we engage and equip the next generation workforce while minimizing the impacts to utilization and production?"

Realities we face:

- Rising costs
- Aging workforce
- Tighter margins
- Evolving industry
- Cross-industry competitiveness



In 2024 survey, 129 Idaho logging businesses reported:

163
job openings reported

345
5 year anticipated number

The Cost of Training

Training Costs & Production Impact

"Can we afford to train, or afford not to?"

- **$120–150K lost production** training new employees
- **4–12 month timeline** to achieve baseline productivity
- **Trainees & the 5 B's:** Bottlenecks, Balance, Buffers, Breakdowns, & Blunders

Current Training Pathways & Funding

OJT (On-the-Job Training)
U of I Student Logging Crew — 2-Year Degree
Shasta College HELO — 17 Weeks → CRAFT
NMCC - MLO — 12 + 8 Weeks



Exploring the Apprenticeship Model

Industry Survey Feedback (321 responses)

- Sought industry feedback to frame Idaho apprenticeship approach
- Explored training structure, duration, content areas, and knowledge gaps

63%

Thought apprenticeship model was a worthwhile training pathway

78%

Believed a training framework of basic skills would be valuable

Proposed Framework & Key Questions

- Proposed structure included multi-week training primer, RSI, and OTJ
- A sustainable funding model is necessary

"Can we take some burden of training off from logging businesses and move trainees further along the training pipeline?"



Leveraging Technology - Equipment Simulators

Foundational Training Impact

"Simulators provide innovative approach for foundational training"

- Supplemental simulator training resulted in 23% increase in volume harvested (Lapointe and Robert, 2000)
- No significant difference in field performance - Traditional vs. simulator-based training (Burk et al. 2023)
- Employee pre-screening has been performed on simulators

+23%

Increase in harvested volume with supplemental simulator training

36–40%

Decrease in training expenses via simulator-based programs

"Simulator training translates to the field through established muscle memory"



What's Next?

Structured Simulator Training

- At what point does training "pay off" (ROI)?
- Does this vary across equipment type?

Cross-training should be leveraged

- Can this be achieved using equipment simulators?
- Integrated into live operations
  - Avoiding operational holes



Forest Operations Research

Operational & Mechanical Delays Effect on Productivity

Examples from the field

Dr. Hunter Harrill, *CA RPF# 3312*

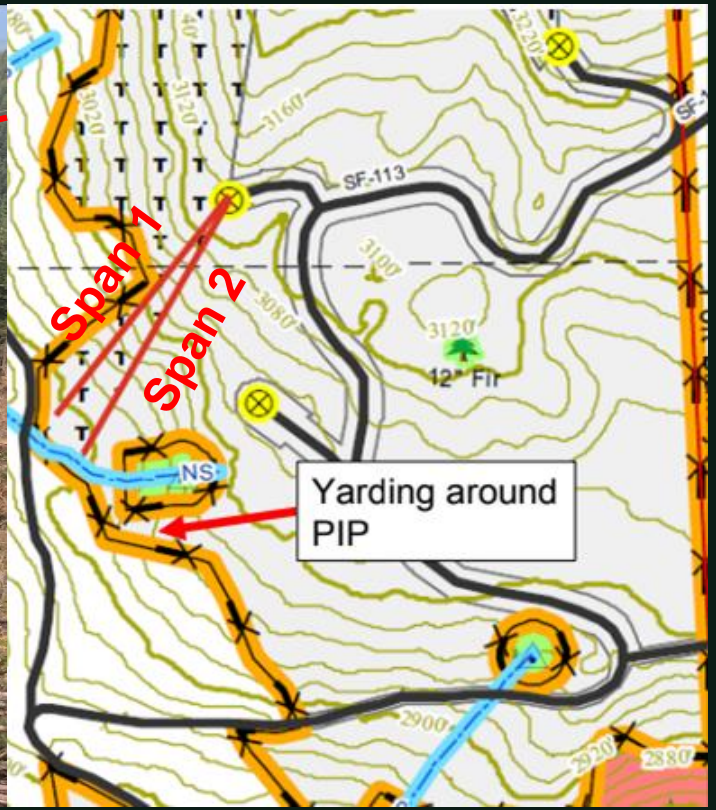
Associate Professor of Forest Operations

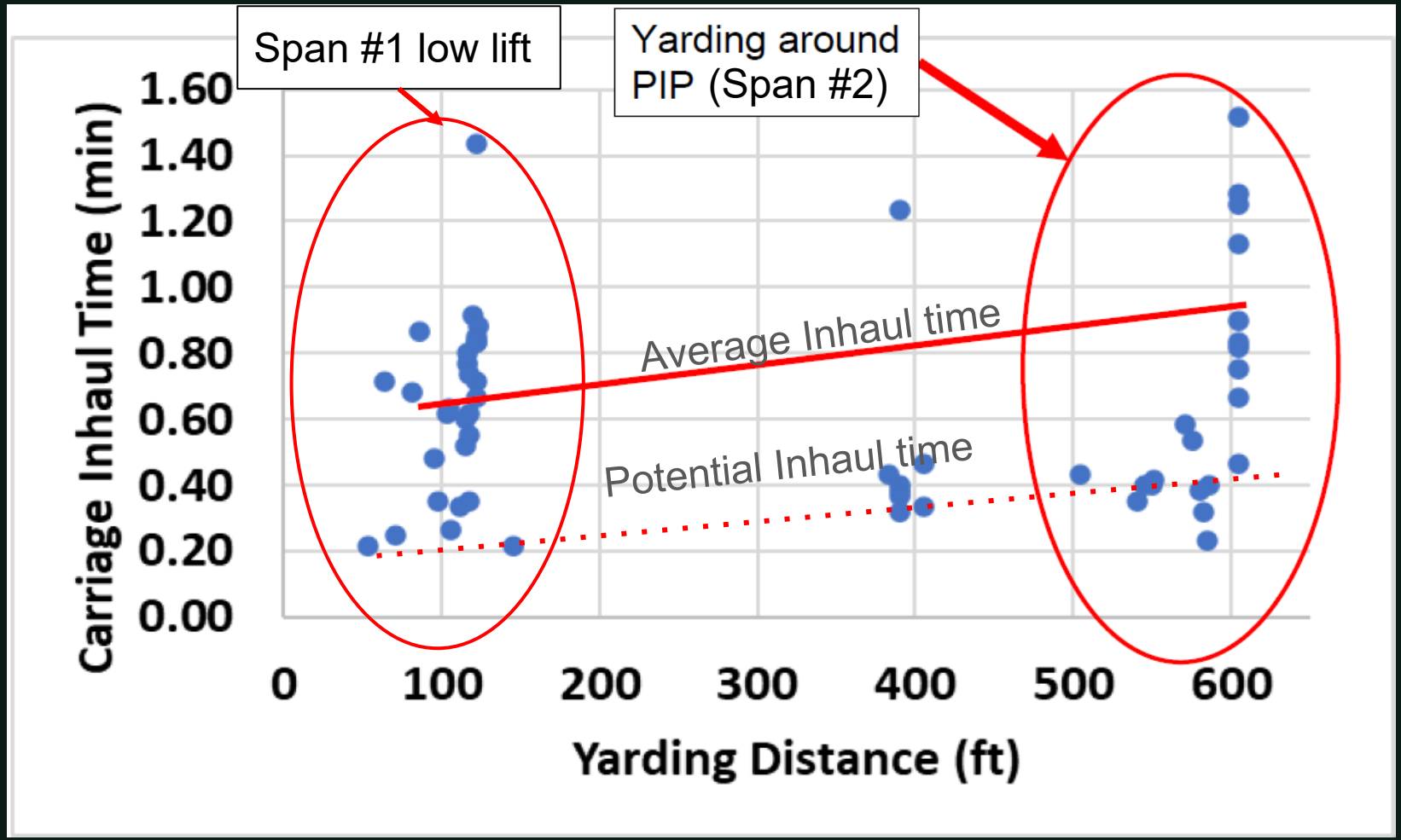
Cal Poly Humboldt

Pacific Logging Congress, Tucson, AZ, 2026

Operational delays: Avoid with effective planning & communication






Span #1 low lift
Yarding around PIP (Span #2)
Average Inhaul time
Potential Inhaul time
Carriage Inhaul Time (min)
1.60
1.40
1.20
1.00
0.80
0.60
0.40
0.20
0.00
0
100
200
300
400
500
600
Yarding Distance (ft)

Short but frequent mechanical delays add up… do the math!

1. LOST TIME (slack in rope)

6 sec/turn × 100 turns/day = 600 sec

= 10 minutes lost / day

2. MISSED TURNS

10 min ÷ 2.5 min/turn (avg)

= 4 turns missed

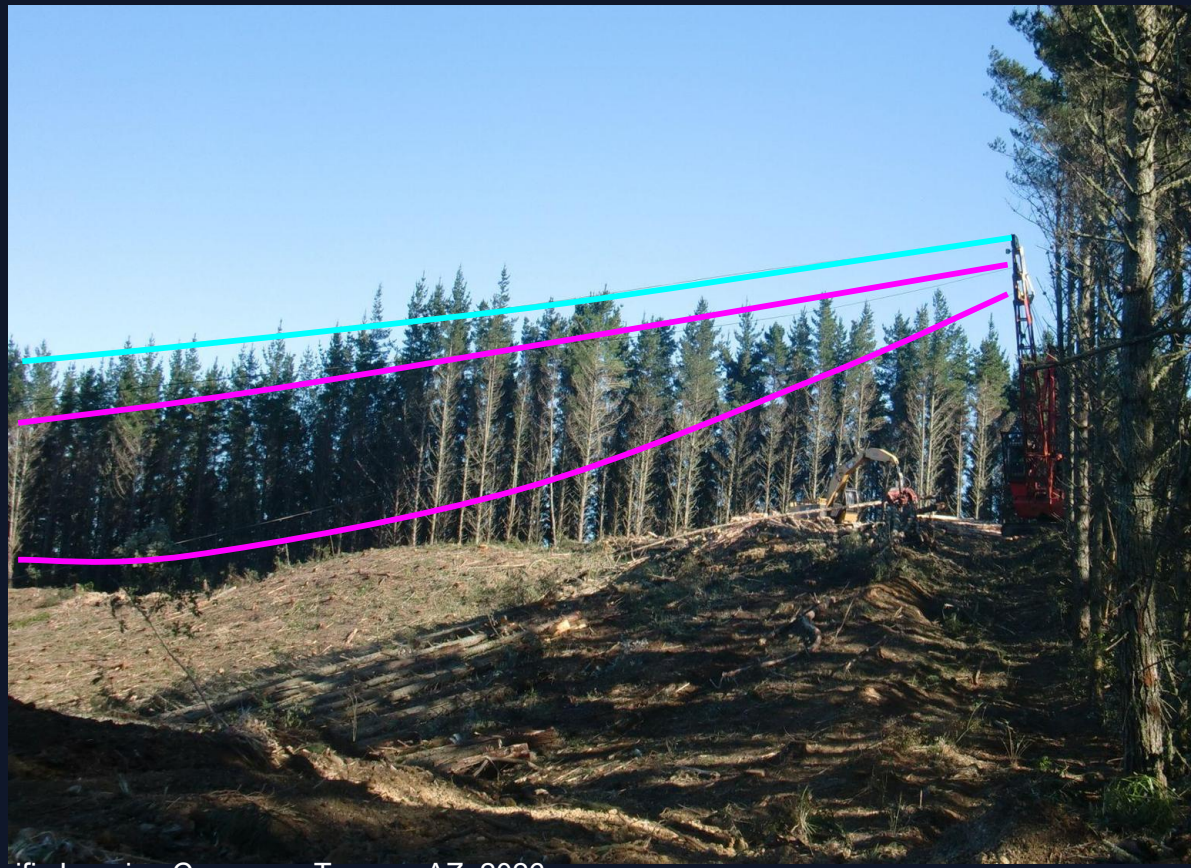
3. LOST PRODUCTION

4 turns × 6.25 tons/turn (avg)

= 25 tons lost / day

Bottom Line Impact

That’s one extra log load per day!



Resources & How to Use Them

STEP 1

Watch

Tackling Productivity in Mechanized Logging

Start by reviewing the foundational video training asset with your team to align on primary productivity concepts.

STEP 2

Handouts & Discussion

The 5 B's of Mechanized Logging

- Facilitate crew discussion on video concepts & examples
  - 1st Priority: Reduce delays
  - 2nd Priority: Improve teamwork, communication & cross-training
- Foster an environment encouraging employees to communicate and share ideas

STEP 3

Monitor & Feedback

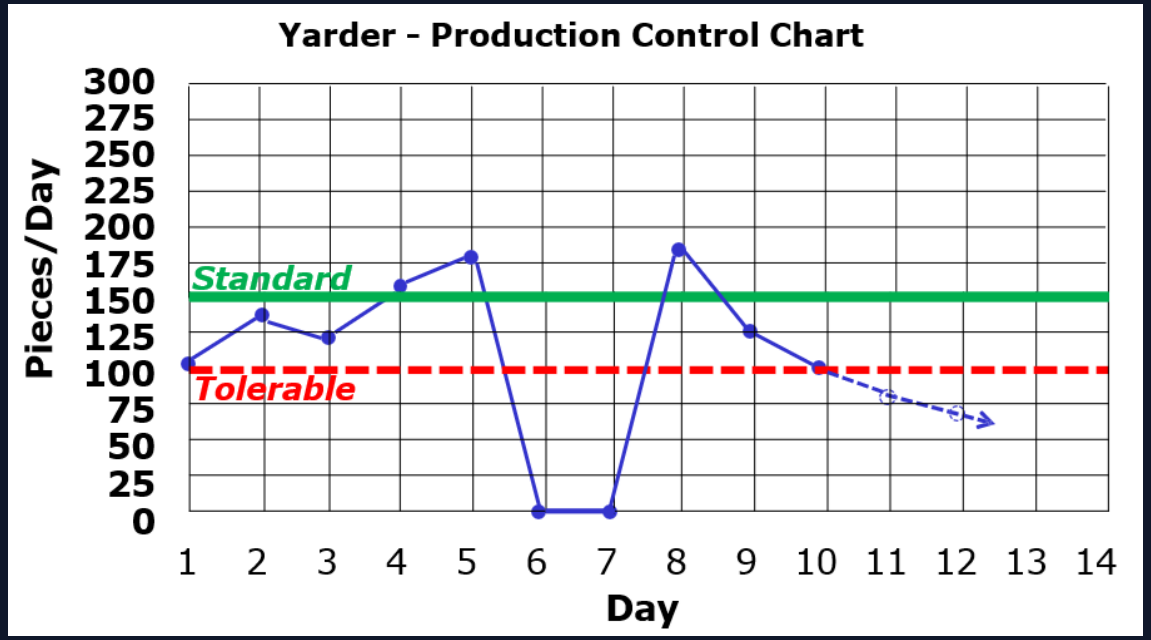
Track performance and provide feedback for continuous improvement using:

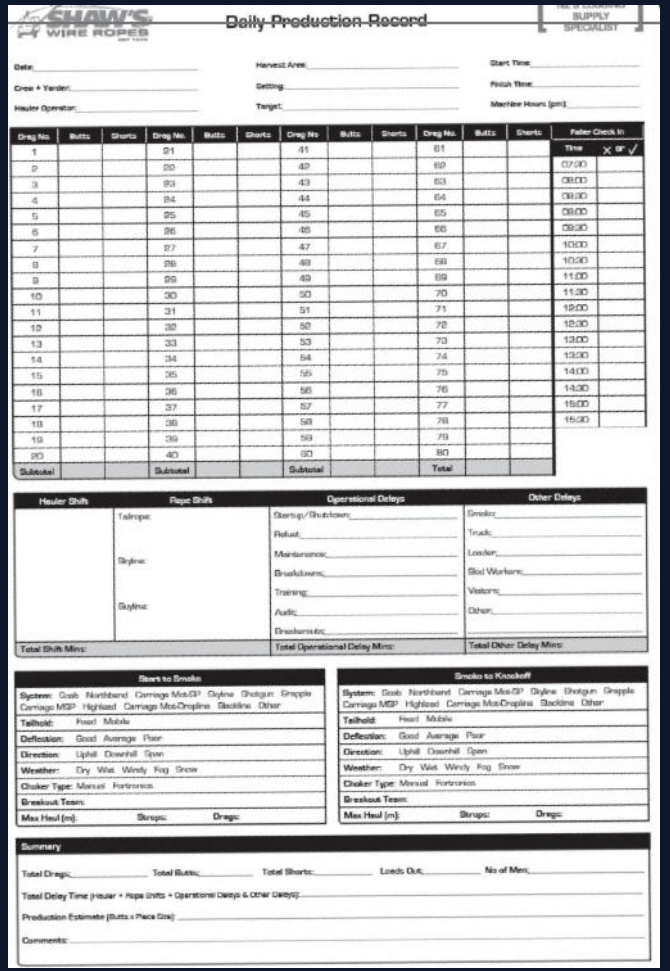
Production control chart

Payload VS cycle time chart

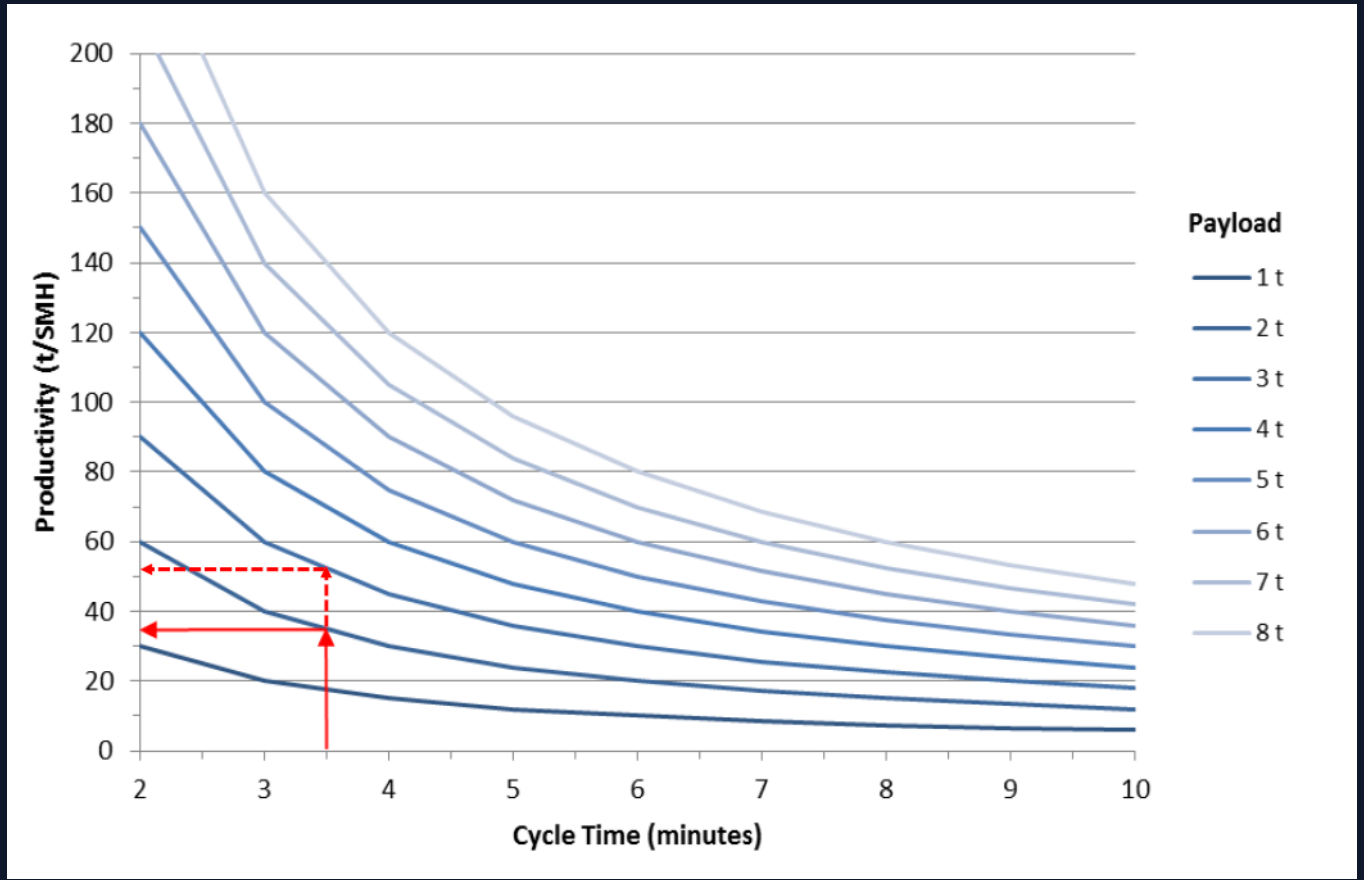
Cross-training roster

Handout: Production Control Chart





Handout: Cycle Time VS Payload Chart



It’s good to try new ideas…Sometimes less is more!







Gisborne New Zealand Study: Sometimes Less is More!

Cycle 16: Big Payload

2.4 stems (4.7 tonnes) • 3.5 min cycle

80 t/hr Production Rate

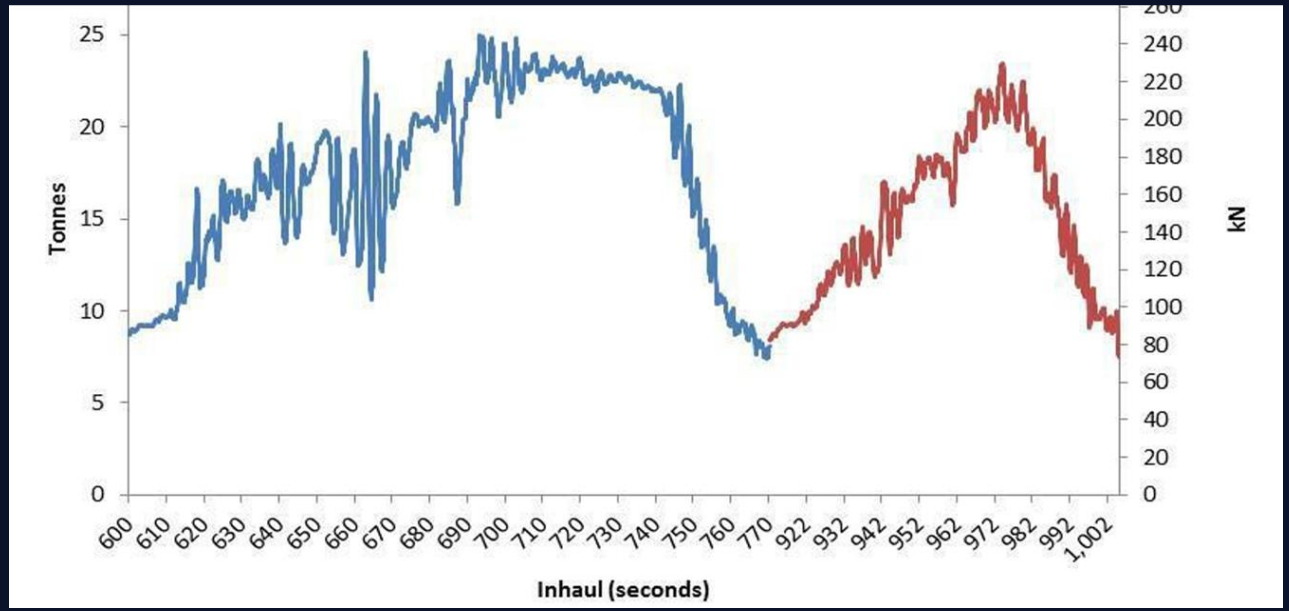
Cyclic Amplification: **1.5** (High Shock Load)

Cycle 17: Smaller Payload

1 Stem (3.6 tonnes) • 2.0 min cycle

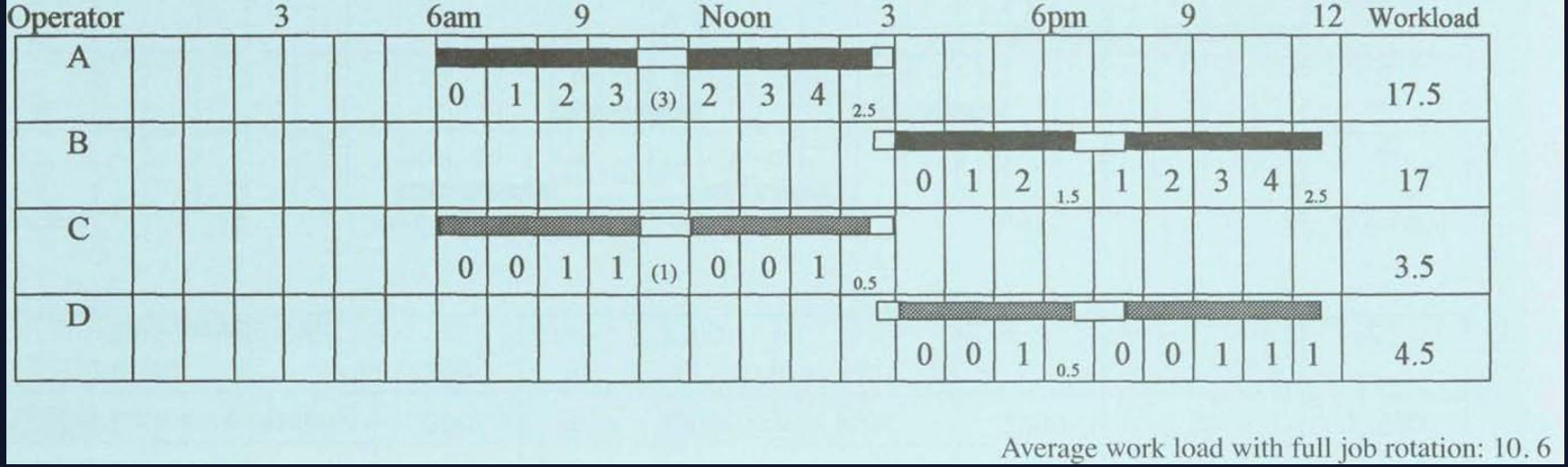
108 t/hr **(+35% Output)**

Cyclic Amplification: **0.68** (Minimal Shock)



Handout: Cross-training Roster (Typical)

	Days[1]/ year	hrs/ day	Calculated hrs/year	Utilisation[2]	Used hrs/year	Productivity ton/hr	Predicted production ton/year
Harvester	200	16	3200	78%	2500	20	50000
Extraction machine	200	16	3200	85%	2700	20	54000
Break,	200	4					
light manual work		2	800				



Average work load with full job rotation: 10. 6

How does it work?

Work Task	Worked Hours			
	1	2	3	4
Harvesting	0	1	2	3
Forwarding	0	0	1	1
Break	0	-1	-2	-3
Light work	0	0	0	0
Heavy work	-2	-1	0	1

Harvesting / Processing / Felling

1st hour gives **0 points**, 2nd hour **1 point**, 3rd hour **2 points**, and so on.

Extraction (Forwarding/Skidding/Shovel)

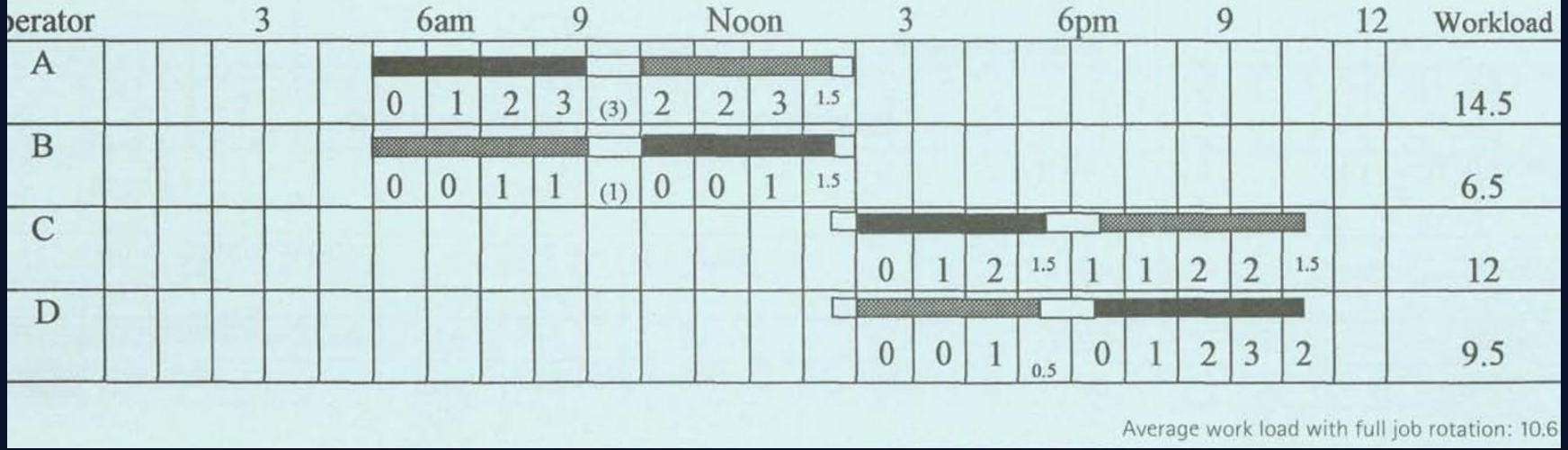
1st & 2nd hours give **0 points**, 3rd & 4th give **1 point** each, 5th & 6th **2 points** each.

Breaks & Light Work

1 hour break or light work reduces following machine workload by **1 point**, 2 hours by **2 points**.

Handout: Cross-training Roster (More Balanced Workload)

	Days[1]/ year	hrs/day	Calculated hrs/year	Utilisation[2]	Used hrs/year	Productivity ton/hr	Predicted production ton/year
Harvester	200	15	3000	78%	2340	20	47000
Extraction machine	200	15	3000	85%	2550	20	51000
Break,	200	4					
light manual work		2	800				



Average work load with full job rotation: 10.6

Concluding Thoughts

Global Impact

The training materials and concepts discussed have been successfully applied for decades by loggers worldwide!

Try them!

Culture & Buy-in

Change is difficult to implement — a culture of continuous improvement is essential, along with crew buy-in.

Reward them!

Tangible Progress

Start with small tangible goals and increase your efforts overtime.

Tackle them!
(Don’t be afraid to ask for help)

Survey: Which workshop topics would you be most interested in?

- How to Use Your Drone to Earn Money?
- Tethered Harvesting Principles & Practices
- Yarder Anchoring
- Logging Cost & Bidding Practices
- Cable Logging Planning & Payload Analysis
- Other?
- Basics of Grapple Yarding

Survey: Which workshop topics would you be most interested in?

Submit Your Vote

Please indicate your primary and secondary topic preferences.

Thank You!

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