



Intelligent Boom Control - IBC

Robotics in the Forest Workshop

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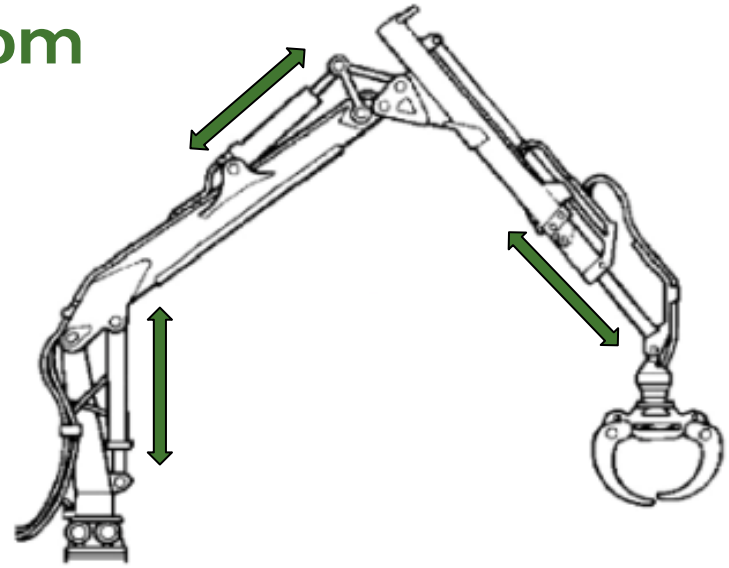
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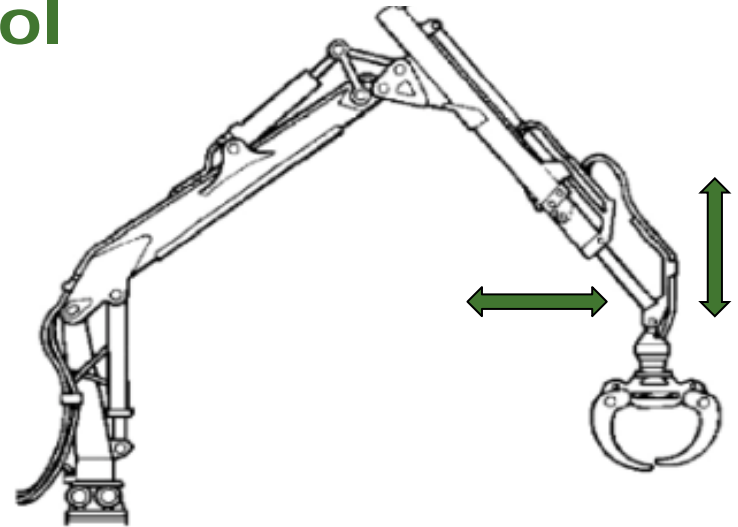
Conventional Forwarder Boom Control

- Operator controls lift, jib and extension cylinders in order to achieve desired boom tip speed and position



IBC - Intelligent Boom Control

- Operator controls boom tip directly instead of controlling individual cylinders
 - Joystick 1: Boom tip forwards and backwards
 - Joystick 2: Boom tip up and down
- Includes cylinder end dampings

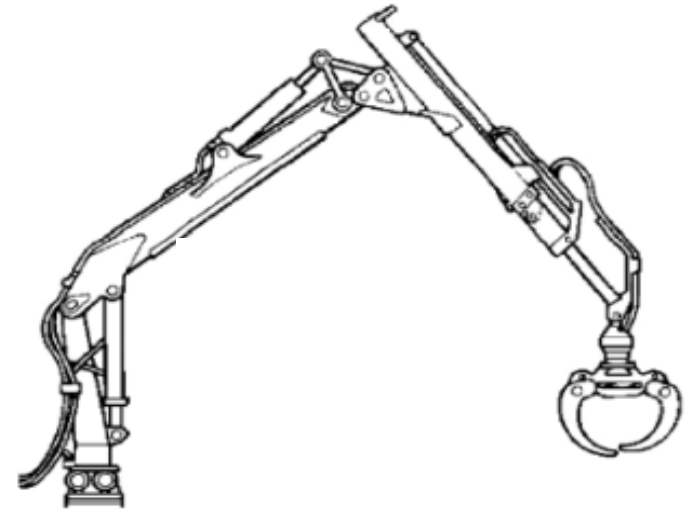


IBC - Customer Value

- Boom easy and very intuitive to operate
 - Shortened learning curve
 - Faster cycle times and thus improved fuel economy [L/m³]
- Reduced operator fatigue and improved ergonomics
 - Operator can maintain high productivity over the long work shift
 - Operator can concentrate on work planning instead of controlling the boom
- Smooth boom motions and cylinder end dampings reduce mechanical stress of the boom and thus improve durability of boom structure and cylinders
- Simple boom tuning due to reduced number of setting parameters

Technical Implementation

- Employed using standard boom valve and embedded electronics
- Advanced algorithms and optimized software implementation
- Cylinder displacement sensors and protected routing of electric cables
- Cost-efficient and robust solution



System Development

1. Kinematic algorithm development utilizing Training Simulator
2. Hardware in-the-loop boom test bench
3. Mule machine with engineering control module
4. Mule machine with embedded software
5. Lead customer fleet for feedback, validation and durability testing





IBC - Customer Desired Feature

- **Elmia 2013 Press:** *"A Revolutionary and much longed-for innovation"*

- **Metko 2014 Test user feedback:**

"Easy" ...

"This will save the boom (structures)"

"Easy to pick up trees from near without fear to hit the machine"

"Really precise"

"This is perfect"

"You have indeed succeeded to create good design and control" (Competitor Instructor)

"This is really good. I wish my boss would buy this"

"Would not like to go back to my own machine"

"Freezingly good"

"Logical. Goes like a thought"



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