John Deere Energy Wood Supply Chains

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FOCUS 2010, Mpumalanga

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John Deere Today

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John Deere Manufacturing Locations

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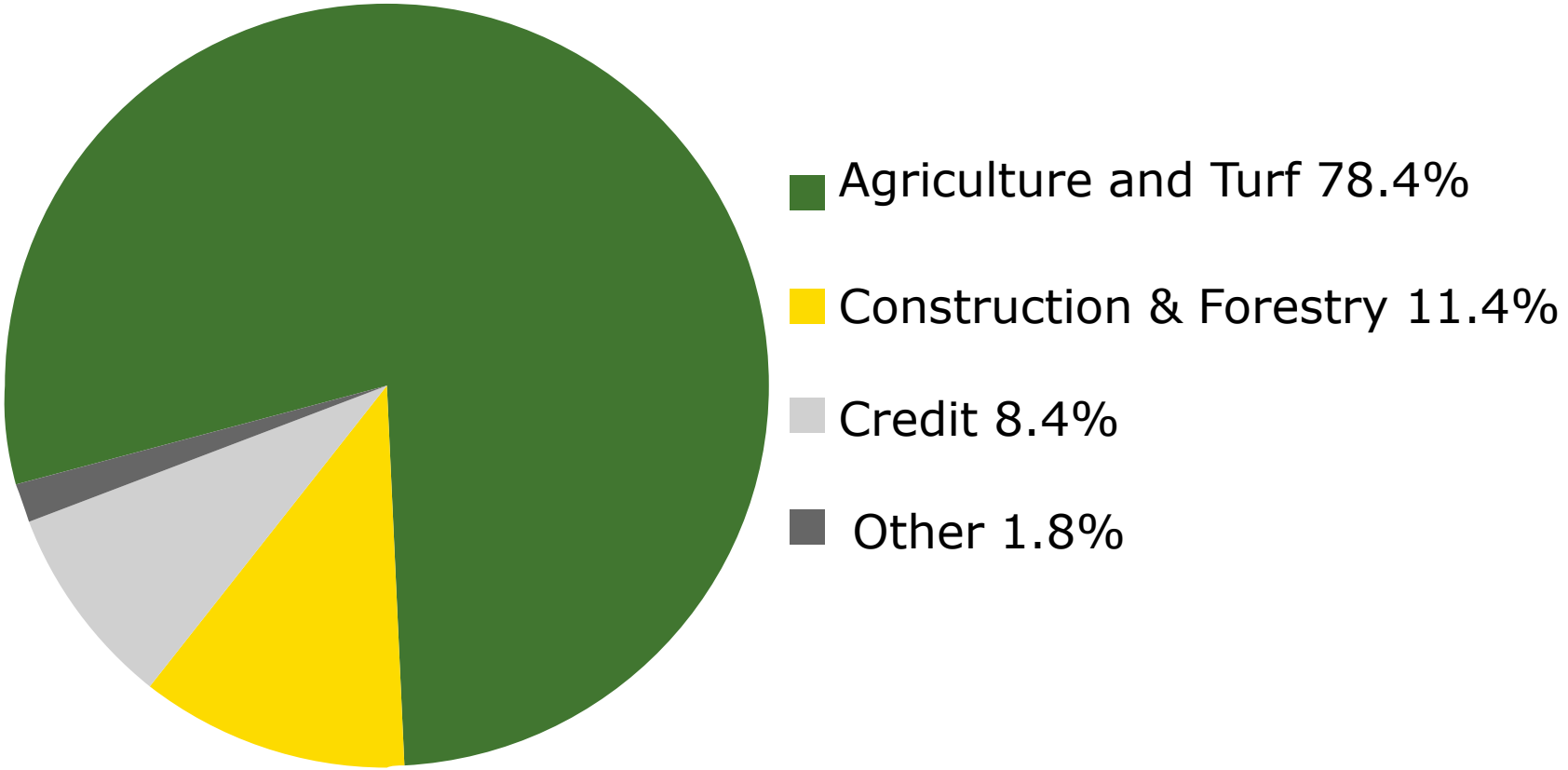
John Deere Today

Helping to establish sustainable, alternative energy sources

- Biodiesel from soybeans
- Ethanol from corn and sugar
- Agricultural waste products
- Biomass from forests

2009 Net Sales and Revenues: $23.11 Billion



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Agriculture and Turf

Global Operating Model

5 Global External Platforms –

A platform consists of a portfolio of 'like' product lines

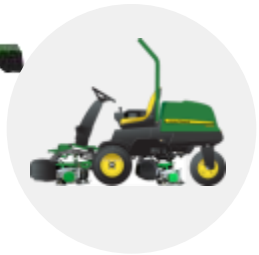
Crop Harvesting

Combines

Front-End Equipment

Cane

Cotton



Turf and Utility

Utility Vehicles

Riding Lawn Equipment

Commercial Mowing

Golf

Walk-Behind Mowers

Hay and Forage

Self-Propelled Forage Harvesters

Heads

Balers

Mowing

Crop Care

Seeding

Tillage

Application Equipment

Tractors

Large (7000, 8000, 9000)

Medium (6000)

Utility (2000, 3000, 4000, 5000)

Loaders

Agriculture and Turf

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Agriculture and Turf

John Deere Sugar Cane Harvester 3520

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Deere Forestry Product Line-up

Forestry
46 Models

Construction
26 Models

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Construction Equipment

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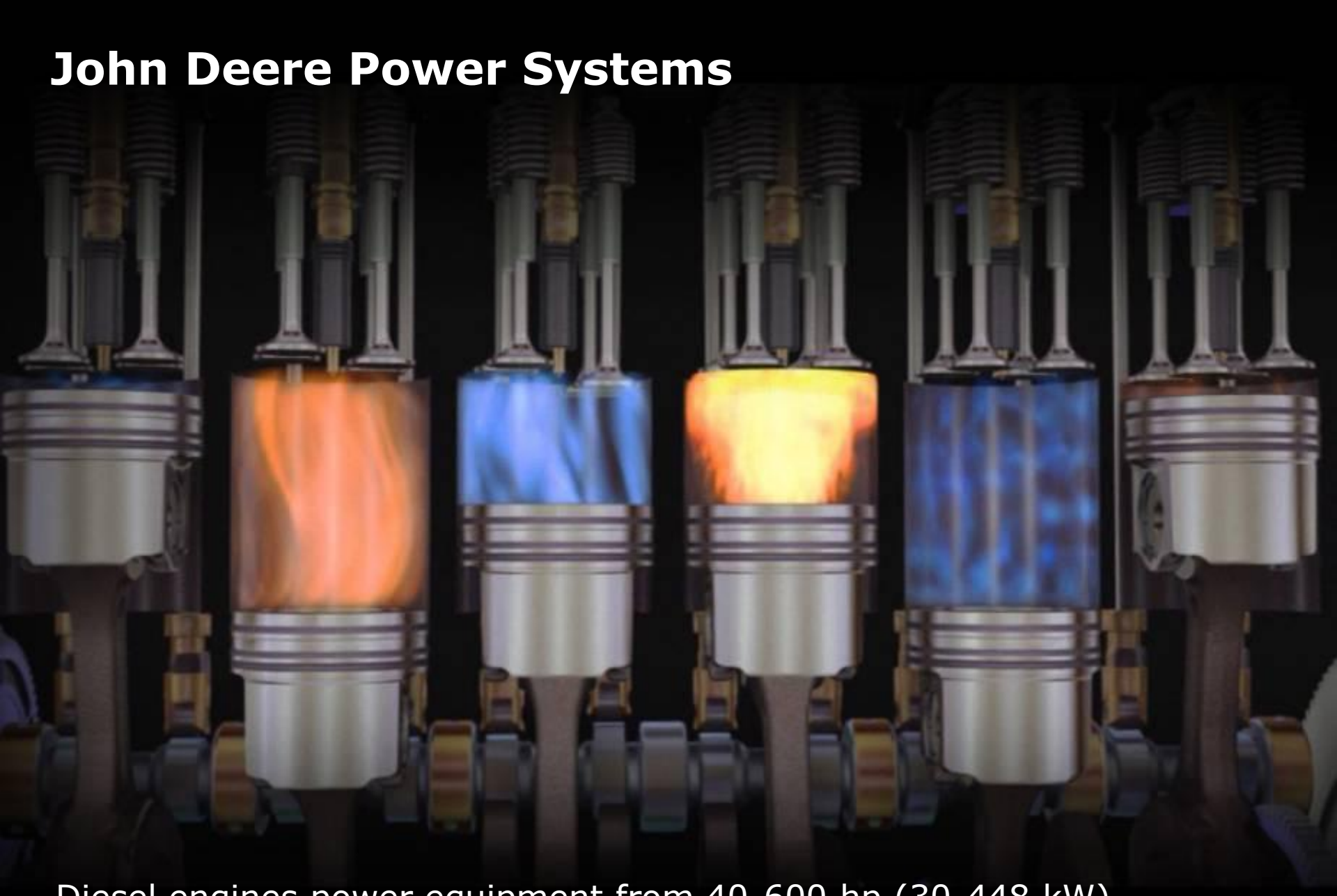
Forestry Equipment

World’s premier producer of timber-harvesting equipment

John Deere Power Systems



Diesel engines power equipment from 40-600 hp (30-448 kW)


John Deere Water
Exciting growth potential

John Deere Intelligent Solutions Group

Extending human capabilities through machine intelligence and information management.

Enabling all John Deere Divisions to deliver integrated intelligent electronic and information-based worksite solutions to customers – fueling superior revenue and SVA growth.

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John Deere Energy Wood Products

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John Deere Energy Wood products

- Base machines for cutting (video)
  - Harvesters
  - Feller-bunchers
- Base machines for hauling
  - Forwarders
  - Skidders
- Bundler (Energy Wood Harvester)
- Harvester Heads with Multi-Tree-Handling
- Weight scaling system

John Deere Cut to Length Machines

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John Deere Full Tree Machines

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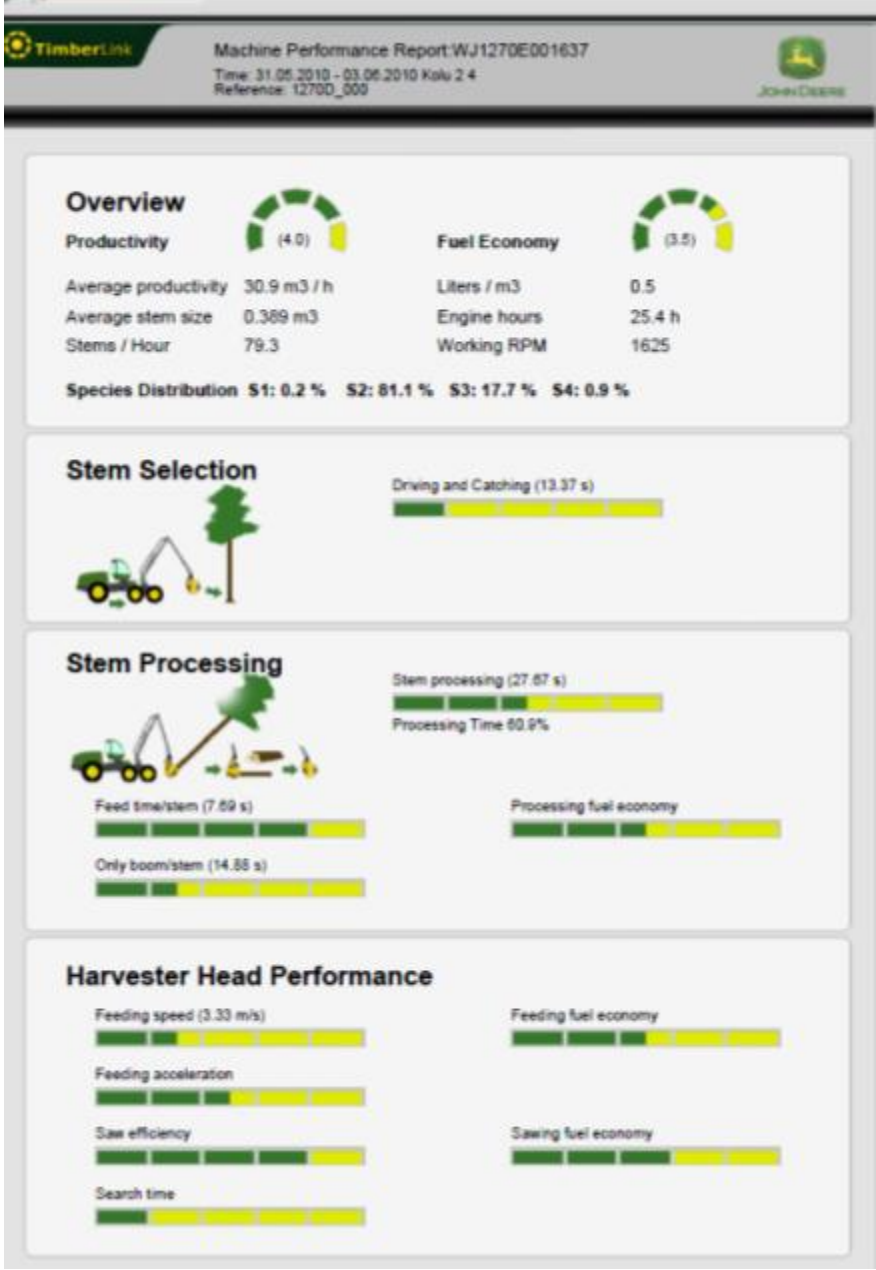
TimberLink

A software application monitoring machine performance and condition

A breakthrough tool to increase productivity and uptime and to reduce operating costs

Flexible software framework enabling fast next steps:

- Intelligent measuring and data analysis will replace guessing in all lifecycle phases



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Harvester heads for E-series harvesters

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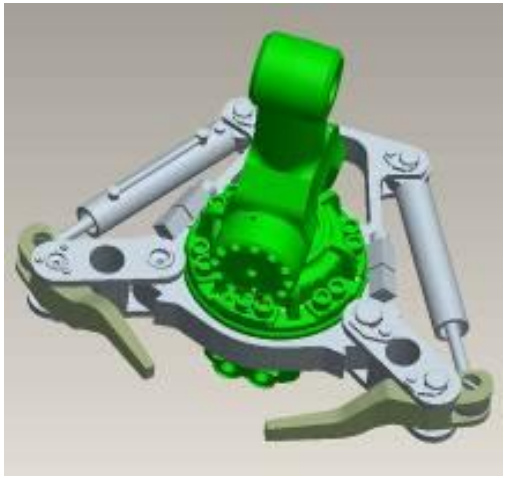
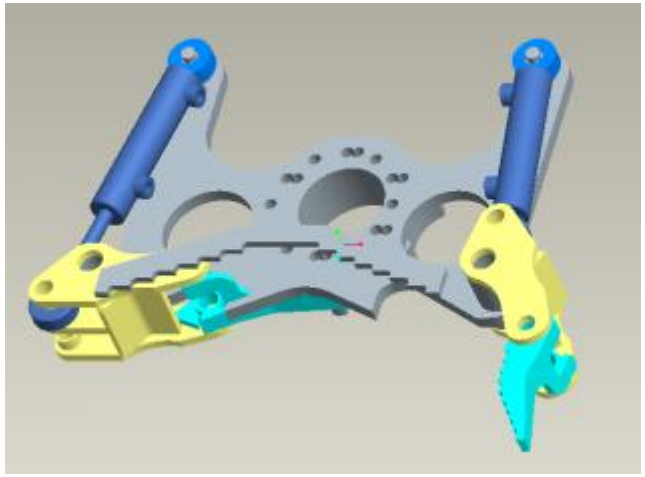
John Deere Multi-Tree-Handling





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Structure of boom scale system

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Slash bundling

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Slash Bundling

- Bundling method
- JD1190D Bundler
- Slash Bundler market

Advantages of bundling method, 1/3

1. The machines involved in procurement chain operate independently of each other **making the system cool and reliable.**
2. The integration of bundle production in the procurement of industrial roundwood is simple, as **off-road and on-road transportation** is able to be performed with standard equipment.
3. **Increases the access** to forest biomass in the areas which are inaccessible to chip vans and big chippers

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Increases the access to forest biomass

Advantages of bundling method, 2/3

4. Reduces a **risk of forest fires**
5. The **reliability** of the woody biomass deliveries is greatly improved, while the overhead costs are reduced.
6. Bundles can be **unloaded** from a vehicle and stored at any stage of the production chain. This possibility, as well as reliable information about the biomass inventories, creates excellent conditions for efficient process control.

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Advantages of bundling method, 3/3

7. The bundler produces accurate **real-time information** about the daily production and inventories. Measuring becomes cost-free.
8. The **storage of bundles is simple**: storage space requirement is reduced, little loss or deterioration of biomass occurs, and long-term storage for the winter season is easy.
9. Remain **good biomass quality**
   - Stores without spontaneous combustion
   - Air-dries while being stored

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Space requirement is reduced

- Bundle compression ratio: average 80%
- Savings with transportation and storing costs

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Slash Bundler Productivity

- Productivity in Scandinavian conditions:
  - Mainly spruce: 90-120 bundles/ha
  - Spruce & Pine: 70-90 bundles/ha
  - 25-45 bundles/ h

- *A 1490D can bundle enough biomass to power 1490+ homes for 1 year, which is the equivalent of 2.5 MW's of CHP capacity.(USA)*

A Bundle Is….

- Logging residuals (limbs, tops, leaves, needles, etc)
- 60 to 80 cm (24” to 32”) in diameter
- Any length, but 3 meters (~ 10 feet) is most common
- 340 to 680 kg (750 to 1500 lbs)
- Energy content: around 1 MWh / bundle
- Wrapped with ordinary baling twine (sisal or propylene)
- Transported on log trailers or flatbeds



JD1190E Slash Bundler (Energy Wood Harvester)

Interesting new features and improvements in

- Diesel Engine
- Hydraulics
- E -cabin
- E- Automation
- Serviceability
- Bundling unit

Slash Bundler Market

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Summary and Conclusions

- Using bundles as part of logistic solution in biomass supply chain can offer several benefits to the forest energy sector: they improve capabilities to **storage woody biomass for energy** use peaks and against price competition.
- Handling of energy wood can be improved by using bundles, when **loading and unloading** can be done in effective way.
- In the optimized supply chain bundling can improve also **yield and quality of biomass**.
- When demand of woody biomass is growing, most probably the transportation distances are also becoming longer: **bundling improves payload** of different transportation methods.
- Bundles and bundlers have **bright future** in growing bioenergy business.

John Deere Forestry – flexible harvesting solutions for forest energy

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John Deere Forestry – flexible harvesting solutions for forest energy

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It all started in a blacksmith shop…
Integrity – Quality – Commitment – Innovation

THANK YOU!

KIITOS!

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FOCUS on Forest Engineering 2010