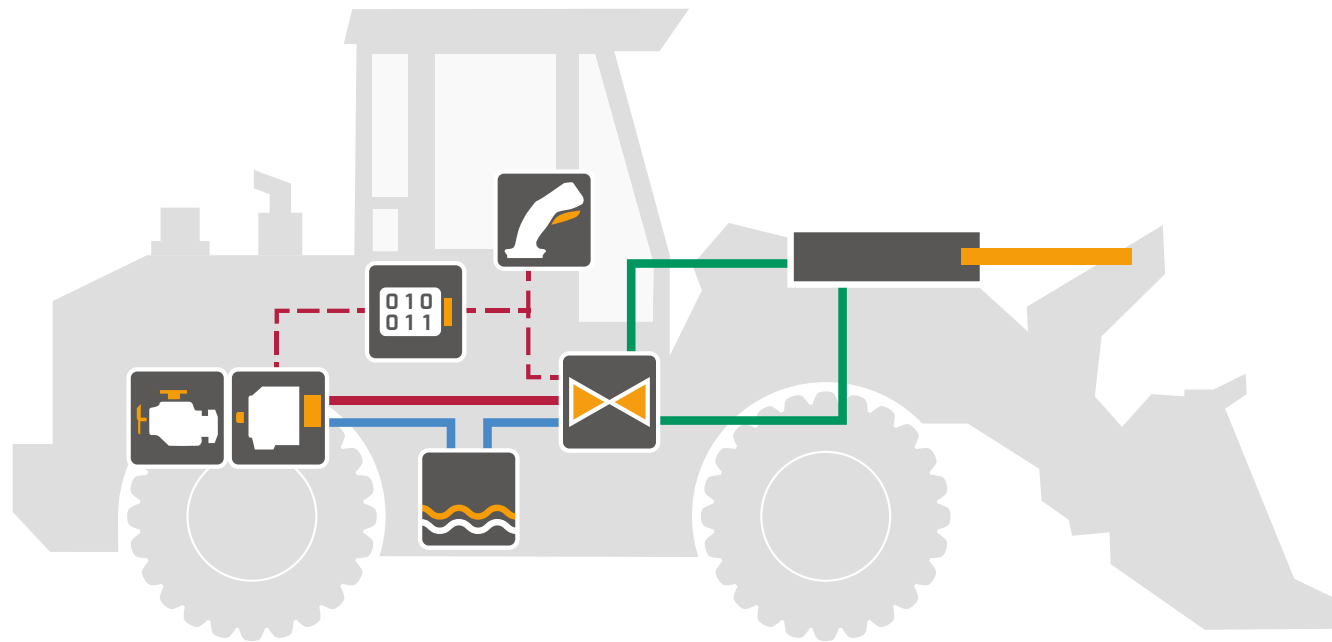


WMT part eBSS

Electro-hydraulic demand flow control
Energy-efficient, responsive, forward-looking



Development goals

The development of eBSS was carried out in cooperation with the Chair of Mobile Machinery.

The general idea behind the project was to optimise the working hydraulics of mobile machines, especially to increase of efficiency of a forestry crane hydraulic system. By minimising principle-related losses of a load-sensing control, the goal was to save energy by more than 10% by using an electro-hydraulic demand flow control (eBSS).

The following objectives were defined:

- Reduction in fuel consumption
- Minimisation of cooling power requirement
- Reduced oil temperature » lifetime of organic oils
- Improved cold start behaviour
- Active influence on vibration susceptibility
- Increased ease of use and productivity

Boundary conditions: Use of common electro-hydraulic components

Our partners:



gefördert durch

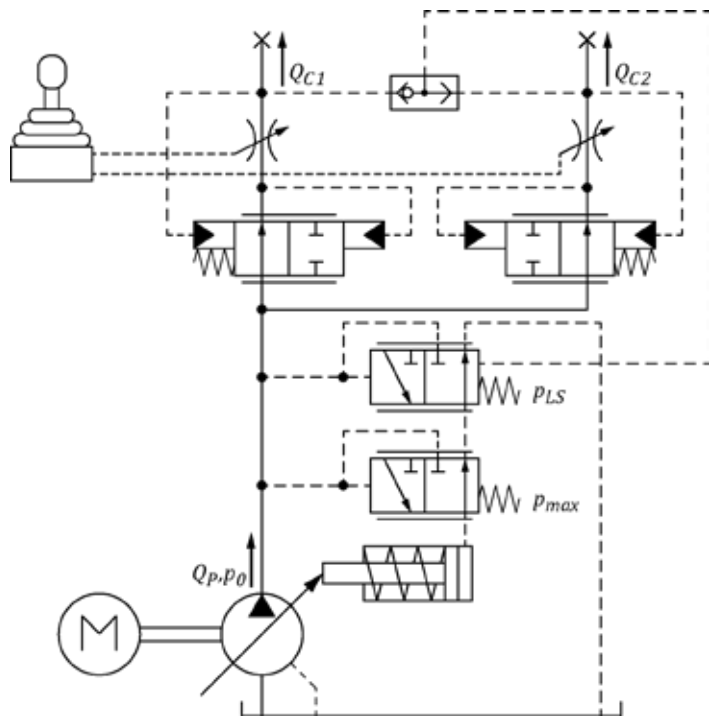


Deutsche
Bundesstiftung Umwelt

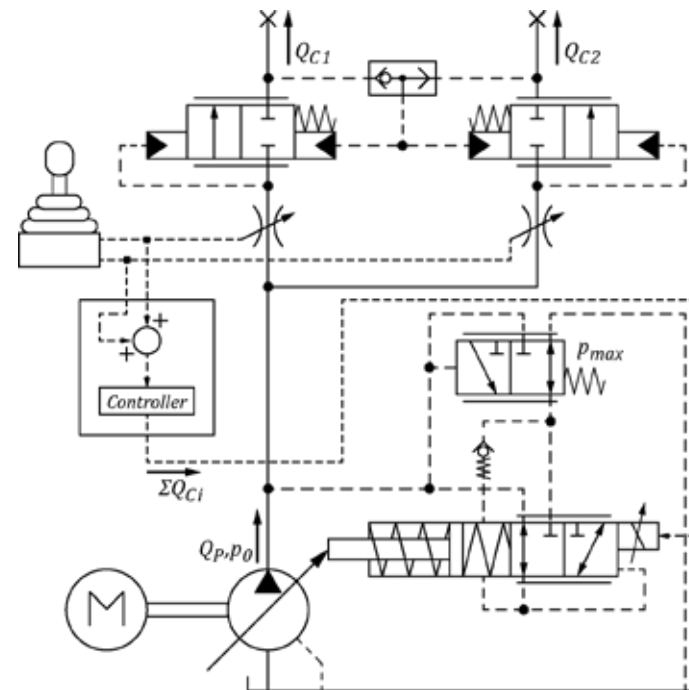
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Implementation

Hydraulic-mechanical load sensing



Electro-hydraulic demand flow control



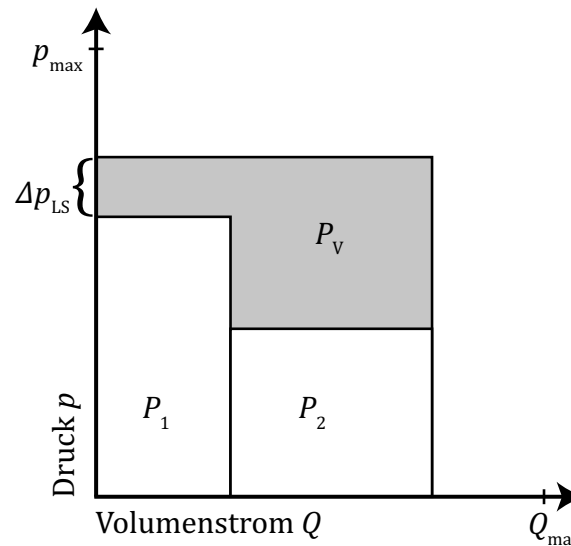
Functionality

The electro-hydraulic demand flow control (eBSS) is an innovative system to control pumps and valves in an open circuit. The system is suitable for stationary and mobile applications.

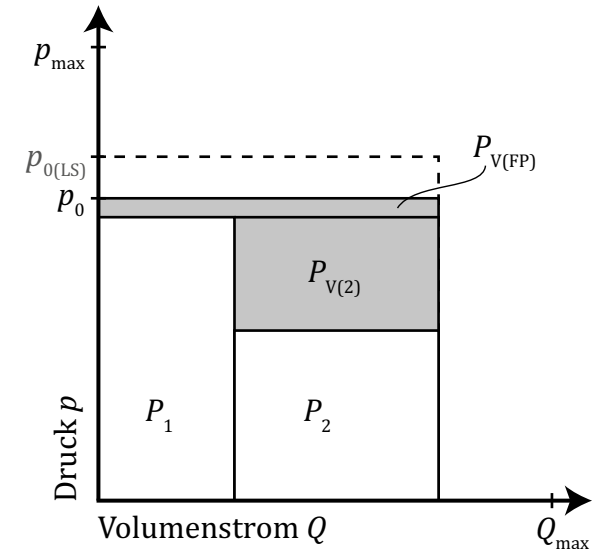
The pump is controlled electronically and adjusted to the volumetric flow rate requirements of the valves. This results in very direct control of the consumers and the energy consumption of the load sensing systems can be reduced noticeably. By controlling the pump without feedback, vibrations can be avoided and the reaction time is noticeably shorter compared to LS systems. For the driver, this increases operating comfort and the machine can be controlled more precisely and better.

Comparison LS – eBSS

Load-Sensing



eBSS



Hydraulic system of the test machine

LS system before retrofit

- 2 x A10VO71...DFR
- 2 x 130 l/min
- 2 x M4-15 control block for crane
- 1 x M4-12 control block for additional functions
- No oil cooler

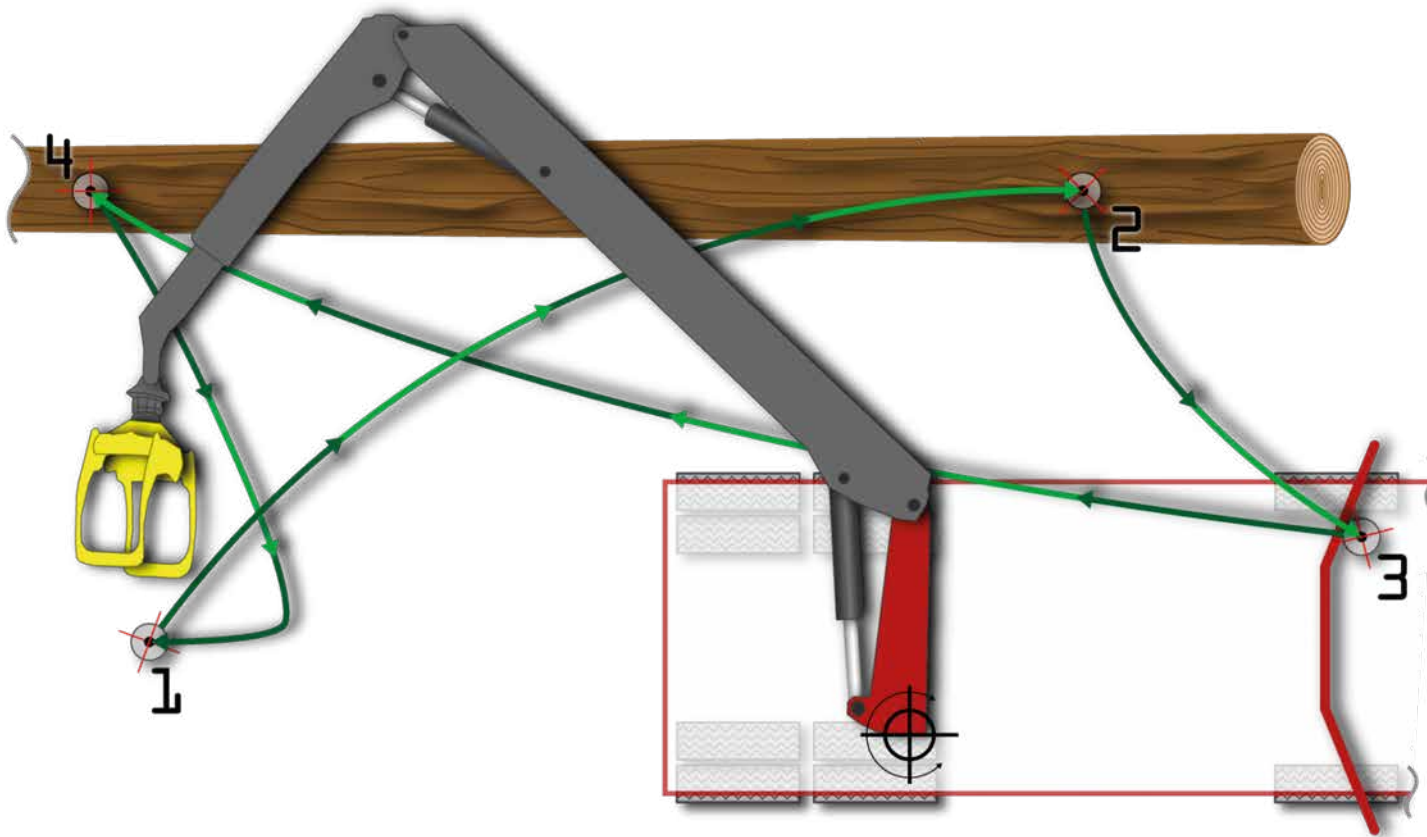
eBSS after retrofit

- 2 x A10VO85...EP2DF
- 2 x 150 l/min
- 2 x LVS12 control block with digital pilot head for crane
- 1 x M4-12 control block for additional functions
- No oil cooler

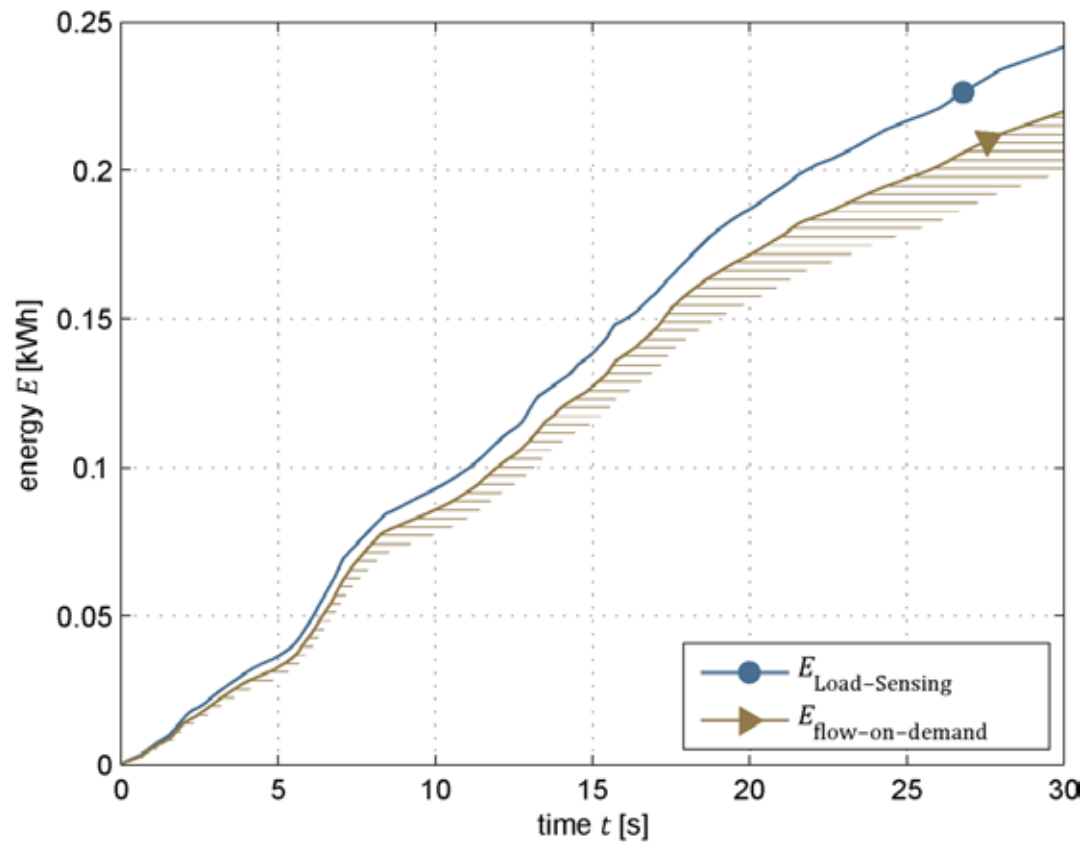


*Weiß Holzentrindung GmbH
Debarking machine*

Load cycle



Simulation results for energy requirement



Highlights

- Suitable for all open hydraulic circuits in mobile and stationary applications
- Fast and vibration-free control
- Energy savings of 10- 20 % compared to load sensing systems (LS)
- Very good cold start behaviour
- Realisable with standard components

Modes of operation

eBSS

Pump volumetric flow rate is adjusted electro-hydraulically to the consumers

eLS

Electric load-sensing
(differential pressure control)

Standard functions

Valves

- Volumetric flow rate limitation OEM and operator
- Control curve
- Ramp

Pump

- Volumetric flow rate calculation and swivel angle control
- Volumetric flow rate limitation
- Safety cut-out

Additional functions

Valves

- Load-dependent volumetric flow rate reduction
- Load control
- Priority function

Pump

- Temperature-dependent volumetric flow rate limitation
- Load control for individual pump and combination

Sections with separate control edge

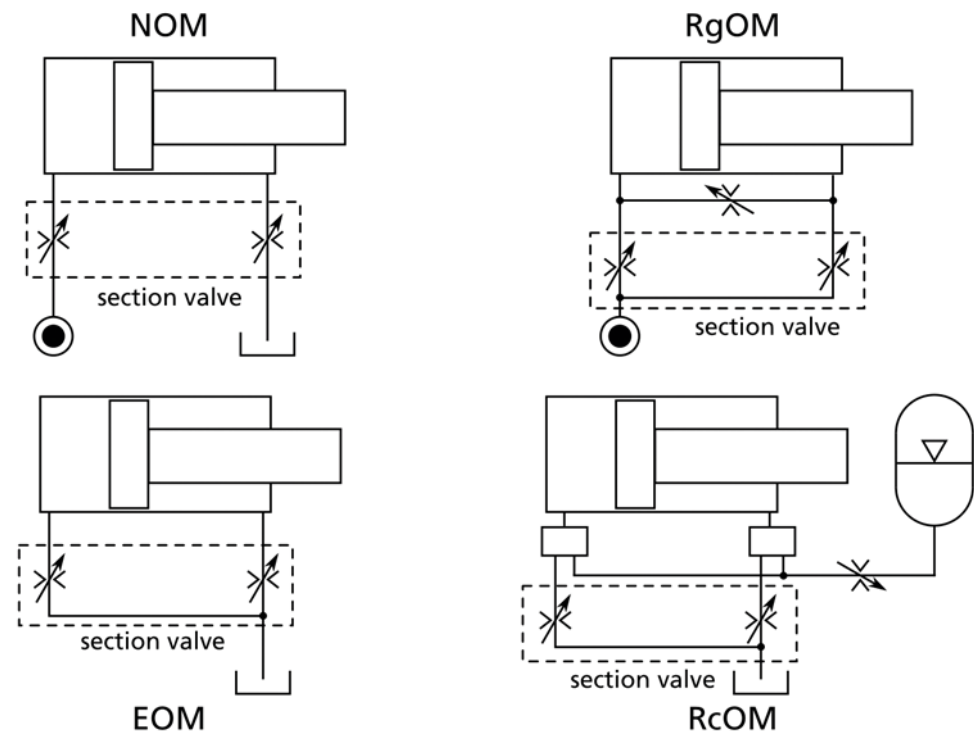
Description

eBSS can also be used with separate control edges. Four different operating modes are supported.

Use of separate control edges increases energy efficiency compared to conventional valves and improves the controllability of the machine at high loads.

The exit side is adjusted to the load and the resolution at the joystick is not reduced as a result. The crane can be controlled load-independently as a result.

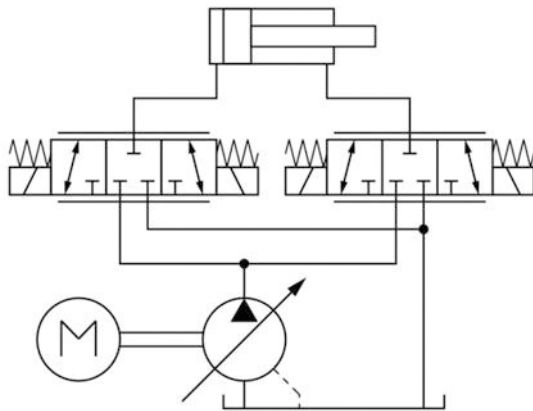
Operating modes



NOM – Normal operating mode
EOM – Energy-neutral mode

RgOM – Regenerative mode
RcOM – Recuperation mode

Circuit design of separate control edges



Advantage

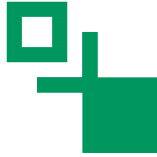
- Individual control of the exit side
- Fast response
- No cavitation
- Good load control

WMT SOLUTIONS in the fields:



SYSTEMS

Fully configurable and ready-to-install complete systems



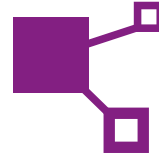
COMPONENTS

Hardware based solutions, preconfigured and tested



SUPPORT

Flexible solutions on-site and remote



CONNECTIVITY

Interfaces for external systems – remote and local

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