



NorrDigi® MCC – Energy Saving Digital Hydraulics

www.norrhydro.com





How Does NorrDigi MCC Work?

Key elements

- The MCC system is based on our proven multi-chamber hydraulic cylinders and patented control system
- Multi-chamber cylinders: 16 area combinations
- Intelligent motion control: smooth and optimized shifting
- Advanced accumulators: excess energy stored and recycled
- Latest enabling technologies: software, sensors, micro processors, directional control valves

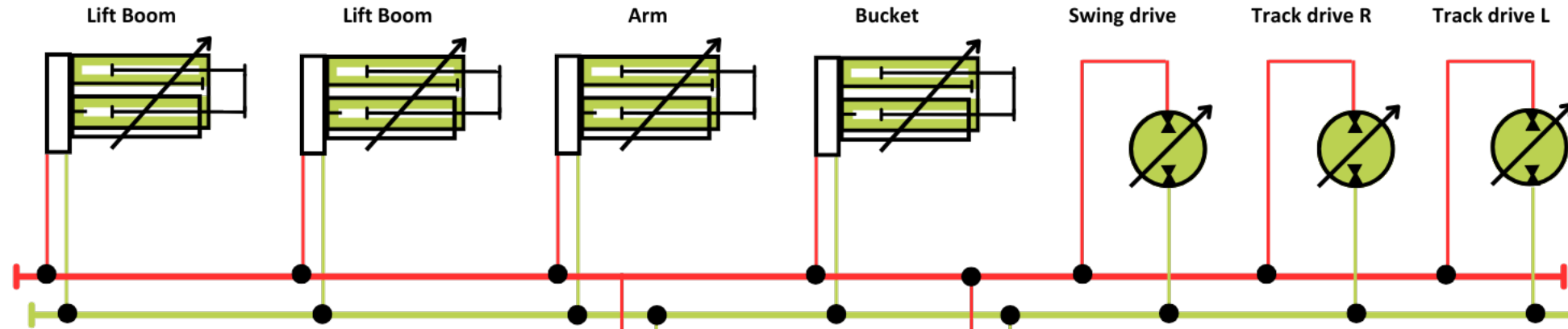


[NorrDigi animation](#)

NORRDIGI® MCC SYSTEM FOR CRAWLER EXCAVATOR

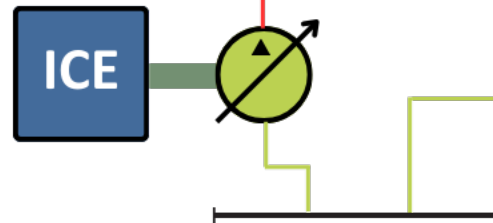
Variable displacement cylinders

Variable displacement motors

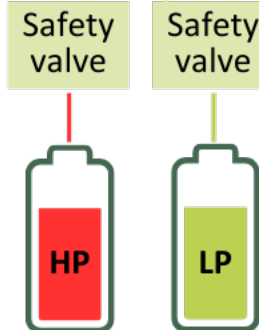


Common pressure rail

Charge pump unit

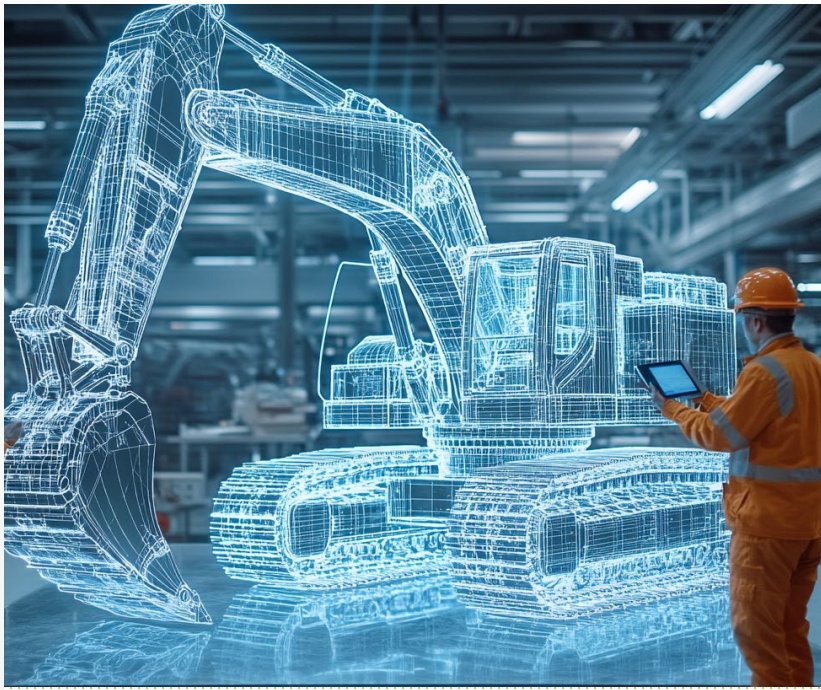


Charging control valve



Energy storage:
High and low pressure
accumulators





Designed According to the Application

Optimal applications:

- Earthmoving machines
- Forklifts
- Material handlers
- Reach stackers
- Mining machines

Benefits:

- Efficiency: 80%
- Energy recovery: 70%
- Increased productivity: 15-60%
- Improved fuel efficiency: 45-60%





Customer benefits

- Increased productivity by precise control
- Automated motion control ensures safe movements
- Downsizing of components
- Automatic energy recovery and re-use
- Remote monitoring, data collection & analytics
- Better fuel efficiency

Value proposition

OWNER / OPERATOR – INCOME STATEMENT

	CURRENT	NORRDIGI ®
Net income	167.250 €	187.320 €
COGS (Labor)	50.000 €	50.000 €
GM	117.250 €	137.320 €
Operating expenses		
Fuel	55.250 €	33.150 €
SG&A	8.000 €	8.000 €
EBITDA		
Interest	4.000 €	4.000 €
Depreciation	40.000 €	40.000 €
EARNINGS	10.000 €	52.170 €



PRODUCTIVITY GAINS, FUEL CONSUMPTION AND CO2 EMISSION REDUCTION



INDUSTRY

Construction equipment, off road mobile machinery.

CHALLENGE / OBJECTIVE

Volvo CE is committed to its position as a driver of change in the construction industry. Strict targets set to reach net zero value chain greenhouse gas emissions by 2040 – with a 30% reduction in CO₂ emissions across product use as by 2030.

SOLUTION

The NorrDigi Multi-Chamber Cylinders and control software replaced the excavator's conventional hydraulics in EC300E model. Main control valve removed – along with excessive pump capacity, piping and hoses. In addition, the system enabled downsizing of engine without impacting machine performance. High and low pressure lines installed with accumulators supplying power boost and storing excessive energy for reuse.

RESULTS

Significant fuel efficiency improvement by -50% compared to same size conventional machine and excellent maneuverability. Potential CO₂ emission reduction 300-350 tons CO₂ during machine lifetime (12.000h).

KEY PRODUCT

NorrDigi MCC cylinders, accumulators, control units and software logic.

VOLVO CE

Volvo Construction Equipment - Volvo CE is a major international company which develops, manufactures, and markets equipment for construction and related industries. It is a subsidiary and business of the Volvo Group.



KEY FIGURES

50 % Fuel saving

30 % Reduction in CO₂
emissions

55-60% Increase in
productivity

RADICALLY INCREASED PRODUCTIVITY, ENHANCED SAFETY



“

"This is a great improvement to both control and safety, as movements can easily be programmed by using NorrDigi software,"

Chris Martin, Aberdeen

”

INDUSTRY

Oil & Gas exploration, drilling equipment.

CHALLENGE / OBJECTIVE

Customer looking to upgrade existing on shore rigs by enhancing productivity and safety in pipe lifting to drill platform. Slow manual operation, frequent oscillation and dangerous working conditions needed to be eliminated.

SOLUTION

Replacing conventional hydraulic cylinder with NorrDigi MCC system to increase overall performance. Power boost installed utilizing pressure chamber, allowing to cut work cycle time significantly. Including control logics with safety features like end cushioning and precise controls to reduce oscillation.

RESULTS

Radical productivity gains achieved; cycle times cut by -60% in pipe lifting work cycle. The results are beyond anything available in the market, enhancing precision, durability and safety – thus helping rig operators to decrease turn around time and relocate drill rigs to new work sites at increased pace.

KEY PRODUCT

NorrDigi MCC cylinder, pressure vessel and control logic.

ABERDEEN

Aberdeen Dynamics is a leading distributor of hydraulic, pneumatic, and electro-mechanical components and systems based in Tulsa, OK with 50 years of industry and engineering design and commissioning experience.



KEY FIGURES

70 % Less Horsepower
required

50 % Reduction in CO₂
emissions

55-60% Increase in
productivity

CUSTOMER CASE – Heavy duty forklift (Electrical)

CONTAINER FORKLIFT WITH 16TN CAPACITY



INDUSTRY

Transportation, vehicles, forklift, container lifts.

CHALLENGE / OBJECTIVE

Target to increase productivity by reaching full work shift on single battery charge, utilizing piston accumulators for energy recuperation. Cost saving by reducing battery package or using single battery pack.

SOLUTION

Switch to multichamber cylinders and install accumulators for energy reuse, reaching up to 73% energy savings with full container loads.

RESULTS

Concept machine built and tested.

KEY PRODUCT

NorrDigi MCC cylinders, accumulators, ECU and control logic with parameter setting.

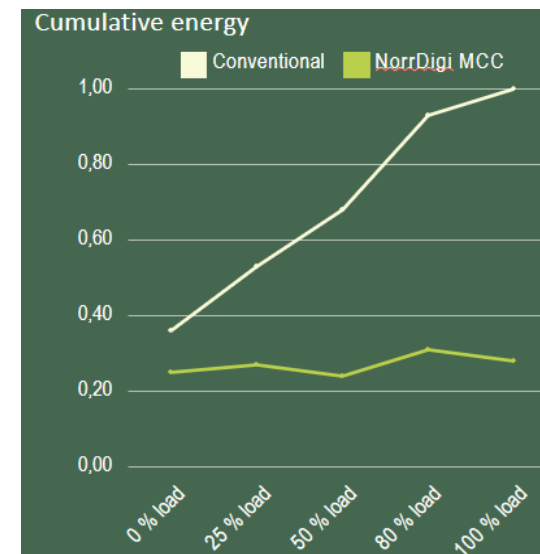
KEY FIGURES

70 % Energy saving

30% Increase in productivity

Customer (confidential)

Customer is a global provider of wide range of industrial forklifts designed to meet various industrial applications, with lifting capacities ranging from 5 - 85 tons. Forklifts serve a wide array of industries, such as logistics, warehousing, steel, wood, metal, concrete, and wind turbine lifting and wind farm construction.



HOOKLIFT FOR MOUNTING BODIES & TIPPING LOADS



INDUSTRY

Transportation, vehicles, trucks, container lift.s

CHALLENGE / OBJECTIVE

Target to increased work cycle and utilize remote operation possibilities. Remove separate booster cylinder and replace with piston accumulator for simpler design and cost benefit. Remote controls for safer and faster operations.

SOLUTION

Replace conventional lift cylinders with MCC for increased peak force and increase operational speed. Motion control logic for remote operations.

RESULTS

In concept phase.

KEY PRODUCT

NorrDigi MCC cylinders, piston accumulator and control logic with parameter setting.

Customer (confidential)

Customer is the world's leading provider of on-road load handling equipment, intelligent services, smart and connected solutions. Hooklifts can handle a wide variety of applications with equipment that is tailored to capacity and operational needs that have a low lifetime cost and maximum uptime.

KEY FIGURES

50 % Energy saving

30% Increase in productivity

10% cost saving in components

MOBILE CRANE FOR TIMBER LOADING AND UNLOADING



INDUSTRY

Transportation, mobile machines, forestry.

CHALLENGE / OBJECTIVE

Improve energy efficiency in handling timber transport loading and unloading work cycle. Increase productivity by having direct feedback from operator input signal. Investigate possibility to do semi-autonomous movements in repetitive work cycles.

SOLUTION

NorrDigi MCC lifting cylinder with piston accumulator as energy storage.

RESULTS

In concept phase.

KEY PRODUCT

NorrDigi MCC cylinders, motors, ECU and control logic with parameter setting.

Customer (confidential)

Customer is a key player in modern forest technology and material handling. It offers innovative, high-quality professional machinery with decades of experience and customer understanding – that helps you succeed, in and outside the forest.

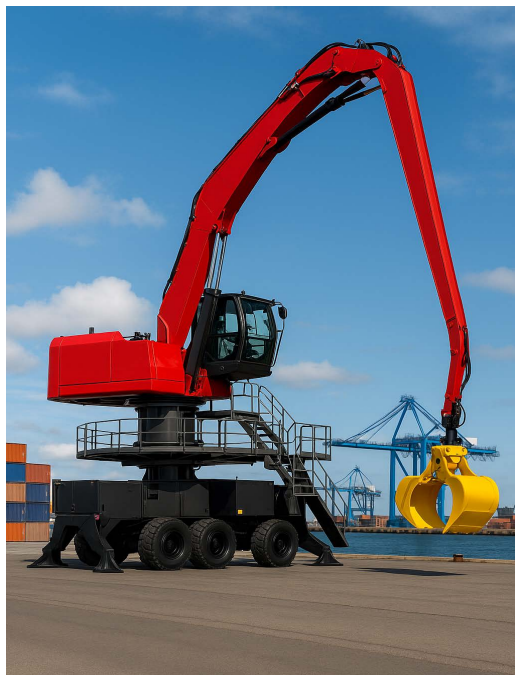
KEY FIGURES

50 % Less energy required

30 % Reduction in CO² emissions

10-15% Increase in productivity

MOBILE HARBOR CRANE FOR BULK MATERIAL HANDLING



INDUSTRY

Material Handling machines

CHALLENGE / OBJECTIVE

Objective to improve energy efficiency when raising the boom and stick and reduce overall fuel consumption. More load need to be lifted with less energy.

SOLUTION

Hybrilift® energy storage and recovery system installed in several models.

RESULTS

Decreases energy consumption and costs up to 50%.

KEY PRODUCT

NorrDigi MCC cylinders, motors, ECU and control logic with parameter setting.

Customer (confidential)

Forerunner in material handling applications. We provide the efficiency, speed and capacity for our customers, who themselves aim to be the strongest links in the global logistics chain.

KEY FIGURES

50 % Energy savings

30 % Smaller motor and pump

30-40% Decreased fuel cost

Customer segments and references

FORESTRY



MATERIAL HANDLING



MINING



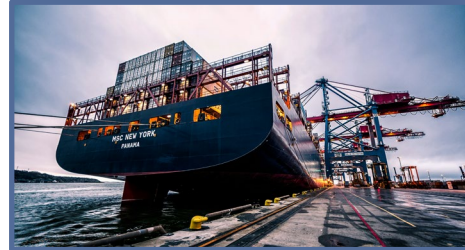
LIFTING AND RECYCLING



CONSTRUCTION EQUIPMENT



MARINE & OFFSHORE



PROCESS INDUSTRY



OIL & GAS



PONSSE



SANDVIK



BROMMA



Junttan
respecting ground

LEGUÁN

Metso

Lännen

waratah

LOGSET

normet

MAGREGOR

TOIJALA WORKS
Engineering Your Vision

KLEMM
Bohrtechnik



KONECRANES
Lifting Businesses™

Avant Wood



DINOLIFT

arctic
a brand of aebl schmidt

Application areas

Adaptive design enables perfect fit for the customer's platform:



Earthmoving machines



Material handlers



Reach stackers



Mining machines



Forestry machines

NorrDigi process steps

01

Project start

Requirements and project plan approval

02

Engineering

3D modelling in customer's machine

03

Prototyping

Proto construction and testing

04

Testing

Final design and external testing

05

Serial production

Production drawings and ramp up

**NORR
HYDRO**



Partner in Success

Thank you!

More information:

www.norrhydro.com

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