

# ELECTRIFICATION SOLUTION



# What is **e+h** solution?

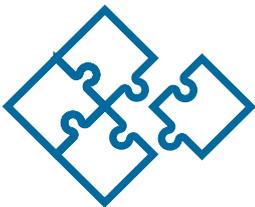
zero  
emission

**e+h** is the flexible and efficient electrification solution built for OEMs to develop their electric off-highway machines.

It combines a versatile system platform with advanced engineering services.

System  
platform

Engineering  
services



+



**e+h** fits perfectly with compact machines like wheel loaders, multi-tool carriers, site dumpers, truck-mounted forklifts, tandem rollers, mini compact track loaders, autonomous agricultural machines and many other ones with similar characteristics.

**e+h** is particularly well suited for the electrification of current diesel machine platforms.



# What are the benefits of **e+h** solution?



## For OEMs

**e+h** has been designed and built as OEM-centric. With **e+h**, you get decisive benefits.

### Marketing and Sales teams

Accelerate time to market for your electric machines. They deliver the **same performance** as diesel ones and profit from **high ruggedness** thanks to their time-proven Poclair hydrostatic core.

### Manufacturing teams

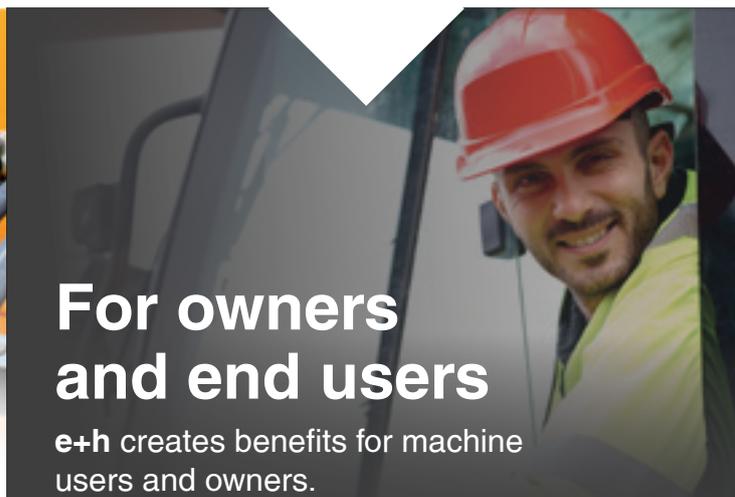
Reduce your **investments** with less assembly line impact.

### R&D teams

Reduce **development costs** as well as get **more peace of mind** thanks to the complete **high added-value** engineering services package.

### Supply Chain and After-sales teams

Benefit from **simplified procurement** flows and stocks thanks to the **high commonality** with diesel platforms.



## For owners and end users

**e+h** creates benefits for machine users and owners.

### Zero emission and low noise

The e-machines are **zero emission** (particulates and gas) and have a **reduced noise level**, which enables them to access restricted areas (low and zero emission zones and sites, underground,...).

### Lower TCO

Compared to the equivalent diesel machines, the ones electrified with **e+h** **reduce total cost of ownership (TCO)** coming from lower maintenance and fuel costs.

### Advanced functions and connected services

Machines equipped with **e+h** system provide additional functions **increasing operation productivity and safety**. In combination with connected services, these functions also enable **increased end user comfort** and **reduced maintenance costs**.

# e+h system

**e+h** is a versatile system for both machine transmission and power distribution to auxiliaries. The transmission relies on electrified Poclairn technology and the auxiliaries rely on electrified hydraulic technology selected by the customer.

The hybrid **e+h** system is comprised of rugged hydraulic components based on cam-lobe in-wheel technology and state-of-the-art electric, power electronics and electronic components combined with advanced embedded control software.

## Display

Colored screen  
Nom. voltage: 8-32 V (DC)  
Size: 4.3 inches



## On-board charger

Input voltage: 110-230 V (AC)  
Output voltage: 48 V (DC)  
Nom. power: 3 kW



## DC/DC Converter

Inp. voltage: 48 V (AC)  
Out. voltage: 12 V (DC)  
Nom. power: 500 W



## Closed loop hydraulic valves

Serial protection  
Exchange

...



## e-motor

AC synchronous Permanent Magnet  
Liquid cooled  
Nom. voltage: 48 - 96 V  
Instant Torque : up to 200 N.m  
Instant Power : up to 40 kW



## DC/AC inverter + Embedded control software

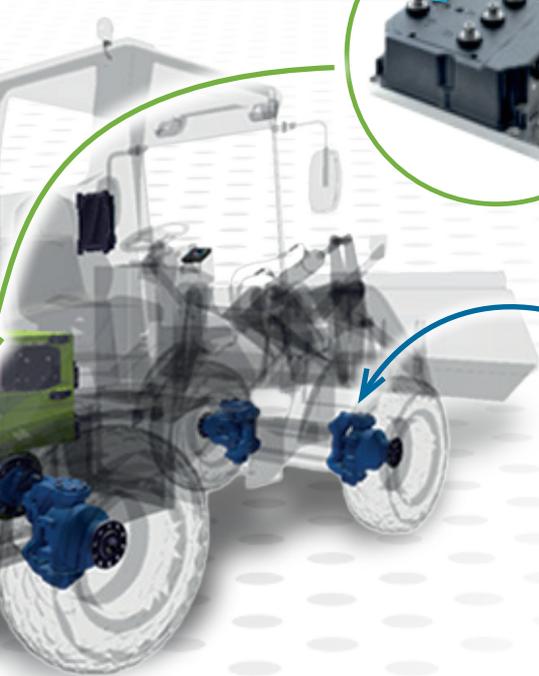


The **e+h** system functionally covers all the life cycle phases for targeted applications and it includes related functional safety according to relevant standards.

Machines equipped with the **e+h** system and a monitoring solution enable operation optimization and maintenance on customer site.

### DC/AC Inverter

Nom. voltage: 48-96 V (DC)  
Output current: up to 650  
ARMS (1 min.) peak



### MS hydraulic wheel motors

The compact in-wheel configuration of the **e+h** system greatly eases integration into the machines especially small ones.

#### MS02 / 05

Max displacement: 398 / 750 cm<sup>3</sup>/rev.  
Max power: 22 / 50 kW  
Max torque: 2 500 / 4 770 N.m  
Max speed: 900 / 700 rpm  
Max pressure: 450 / 450 bar

### Hydraulic pumps

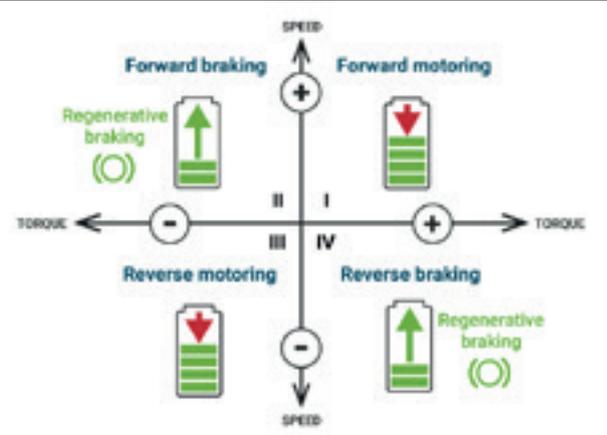
#### PM10 / 20 / 30

Variable displacement  
Max displacement: 21 / 28 / 35 cm<sup>3</sup>/rev.  
Max speed: 3 600 / 3 600 / 3 600 rpm  
Max pressure: 350 / 370 / 420 bar



### Increased vehicle range and reduced battery size

Thanks to regenerative braking as **e+h** transmissions operate 4-quadrants



For more information about  
our electrification solution





# e+h engineering services

e+h is also a complete engineering services package built for OEMs to efficiently externalize engineering work required to develop electric transmissions and power supply to auxiliaries.

The value-added e+h engineering services are deployed throughout customer projects, from the expression of needs up to the serial life in OEM's factories, including prototype development.

## Duty cycles analysis & Expert report

**Data monitoring on diesel machines for duty cycle** consolidation in field conditions, then **data analysis by experts** to support e-machine development, sizing and system simulation.

## Components sizing

Optimal sizing and component selection **based on duty cycle and mission profile** shared by customer or connected engineering inputs.

## System simulation

System simulation of selected architecture to **optimize machine performance and battery sizing**.

## Embedded software development

Software for **transmission** and power supply to **auxiliaries**, **communication** between components and **energy sharing** within the system.

## Functional safety assessment

Assessment of system functional safety levels based on **customer version and HMI** according to relevant **standards**.

## System integration

Support to system integration in **customer machine** and recommendations for **noise, vibration and harshness (NVH) improvement**.

## Commissioning & Connected commissioning

Prototype e-machine **commissioning** at Poclairn facilities, then prototype e-machine **data monitoring** in field conditions and finally **data analysis by experts** to confirm performance.

## Customer trainings

Customer training on system **installation and setup** at Poclairn facilities or on site.

# Connected Engineering

## Connected Services for Data-based Machine Developments

From pre-engineering to series production, Poclair collects and analyzes data from field operations to get the reliable inputs needed to optimize and validate your machine design and performance.

ACCESS ESSENTIAL DATA FOR NEW DEVELOPMENTS

MEET EXPECTATIONS FOR MASS-PRODUCTION

### Direct Online Duty Cycle

Connect your machines & Learn

- Automatic analysis
- Factual data
- 100% digital

### Expert Report

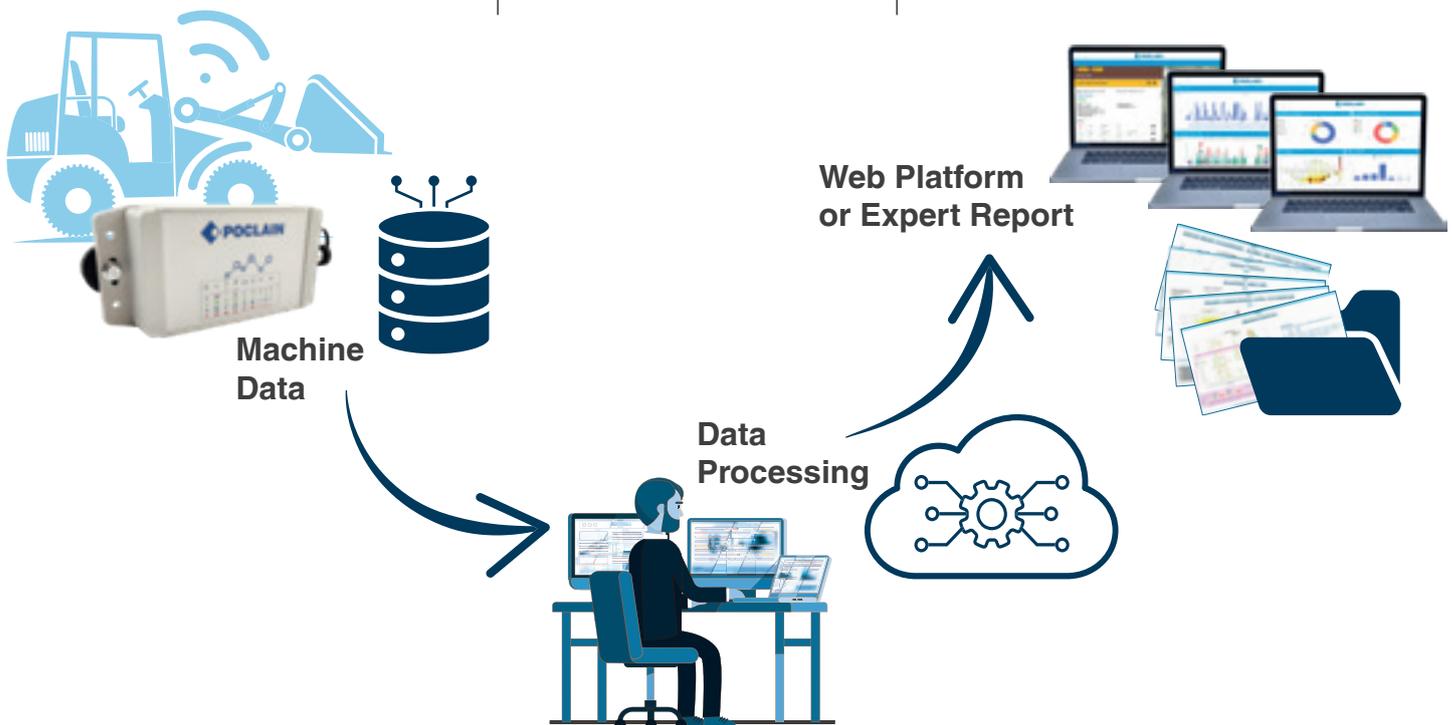
Extract Value From your Data

- In-depth analysis
- Customized report
- Make best technical choices

### Connected Commissioning

Monitor prototypes and pre-series machines

- Qualify machines in actual operating conditions
- Faster problem solving
- Reduce time to market





[www.poclain-hydraulics.com](http://www.poclain-hydraulics.com)