



Industrial Hydraulics – Are we really on track concerning Industry 4.0?

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Industrial Hydraulics – Are we really on Track in Industry 4.0? Hydraulics of the Future



Industrial Hydraulics – Are we really on Track in Industry 4.0?

Digitalization and Impact on Today's Standard Hydraulics



110110101101100
111101010010111
110001010010010

Data



Communication



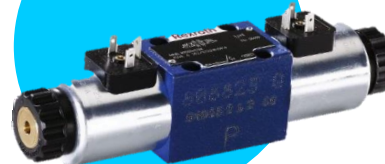
Network

>80%
Standard

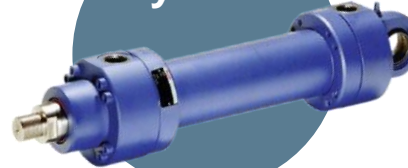
Power
Unit



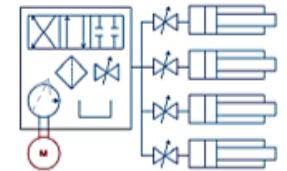
Valve



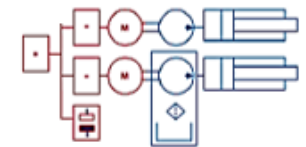
Cylinder



Standard
Hydraulics



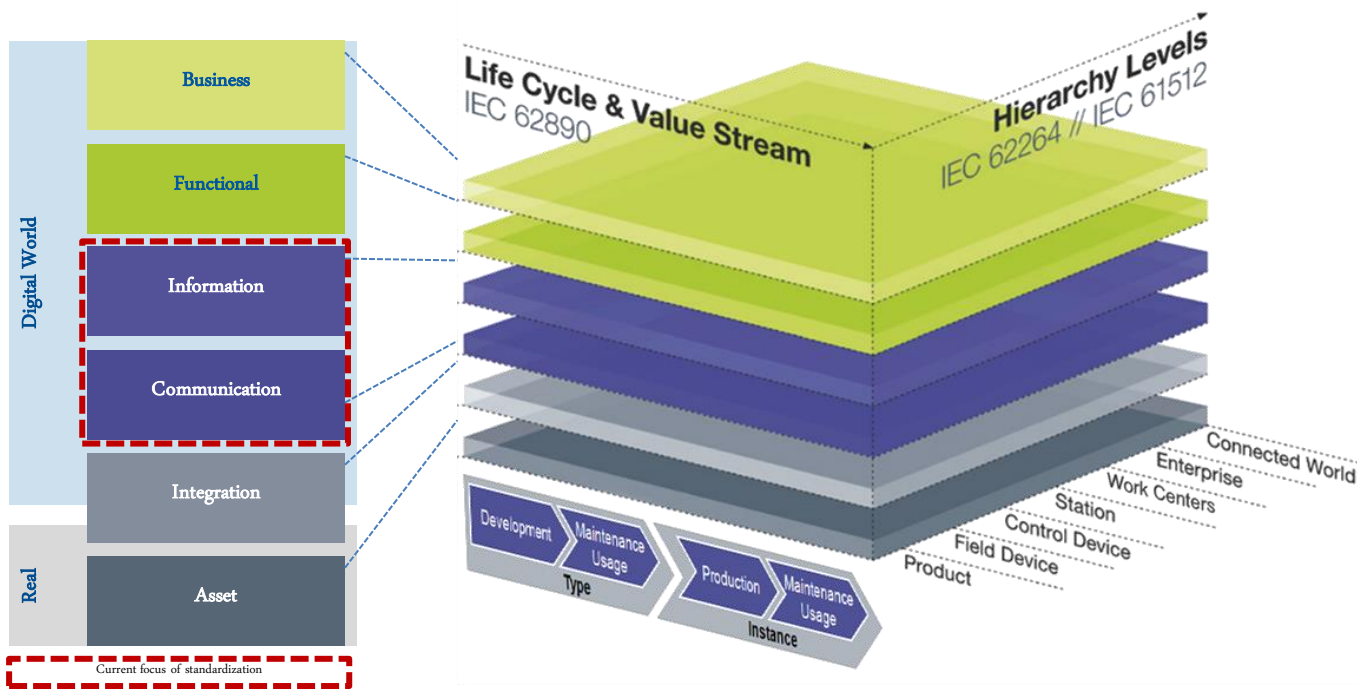
Electro-
Hydraulics



Industrial Hydraulics – Are we really on Track in Industry 4.0?

Reference Model and Status of Technologies

Reference Architecture-Model I4.0 - RAMI



Implementation Degree
Estimation [0 - 100%]

Electrics



Mechanics



Pneumatics



Hydraulics



Industrial Hydraulics – Are we really on Track in Industry 4.0?

Standardization as Basement for Global Digital Communication

Participants



Content and status of working groups

VDMA Group Industry 4.0 Fluid Technology

Elaboration of cross-technological and Industry 4.0 relevant data from

- supplier
- machinery manufacturer/OEM
- End-user



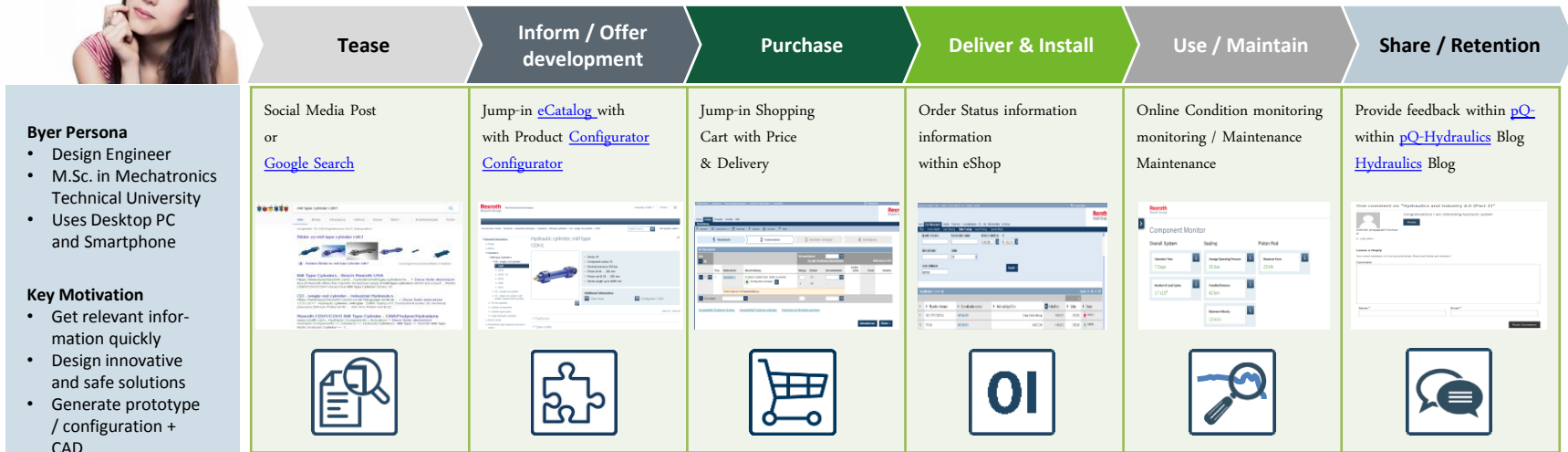
FG 27-30 „eCI@ss-Standardisierung Hydraulik

Elaboration of characteristics for hydraulics based on

- ISO13584
 - IEC61360
- within an eCI@ss specialist group

Industrial Hydraulics – Engineering

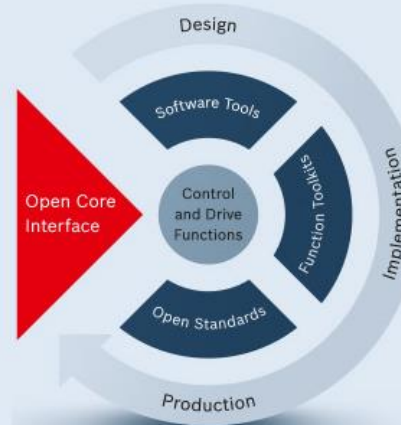
Digital Customer Journey – Example Industrial Cylinder



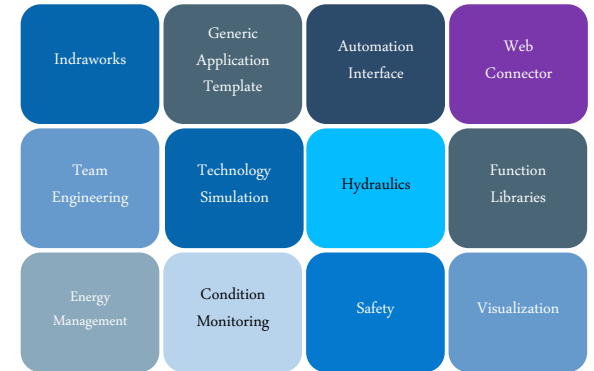
Output:
PDF, 2D/3D-CAD,
Simulation Data

Industrial Hydraulics – Engineering Intuitive Engineering Tools - Easy to Use

High Level Language Integration via Open Core



Software Tools and Function Toolkits



MLC-H



HMC



IAC



DFE



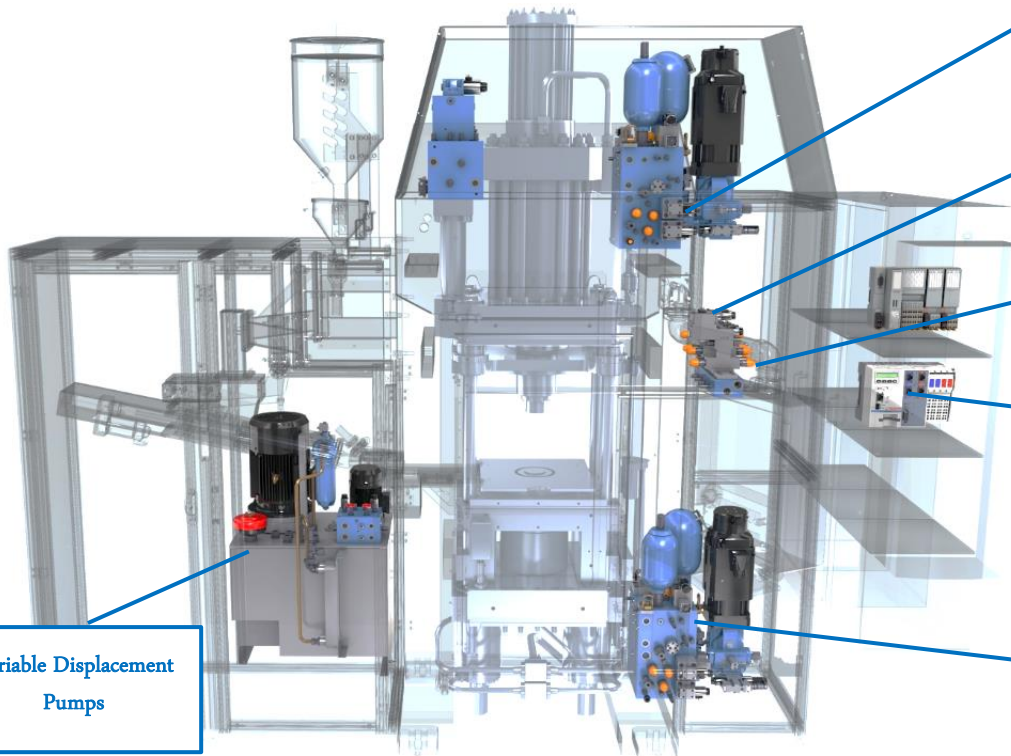
Indradrive



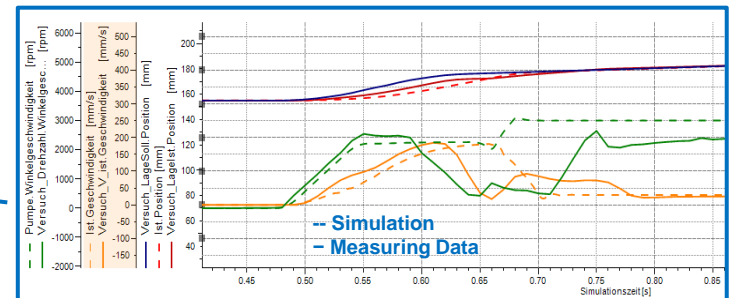
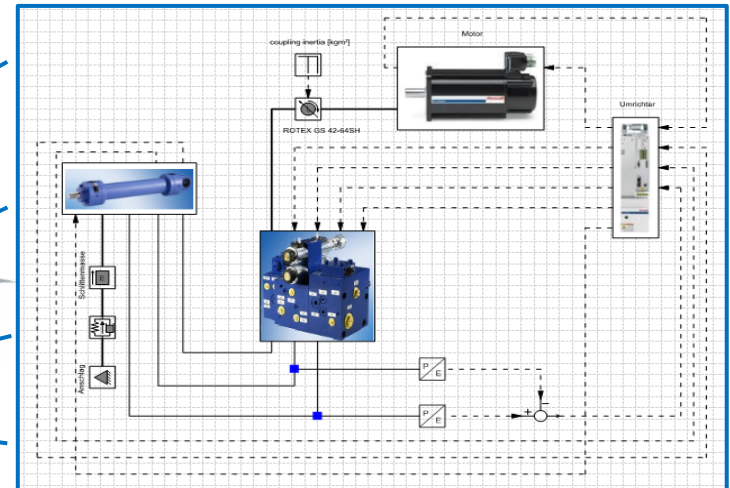
SHA



Sytronix



Variable Displacement
Pumps



Industrial Hydraulics – Engineering

2nd Step: Real Machine



Industrial Hydraulics – Engineering

3rd Step: Data Based Services





Digital platform electronics



New Digital Interfaces

(Ethernet based, Wireless, IO-Link)

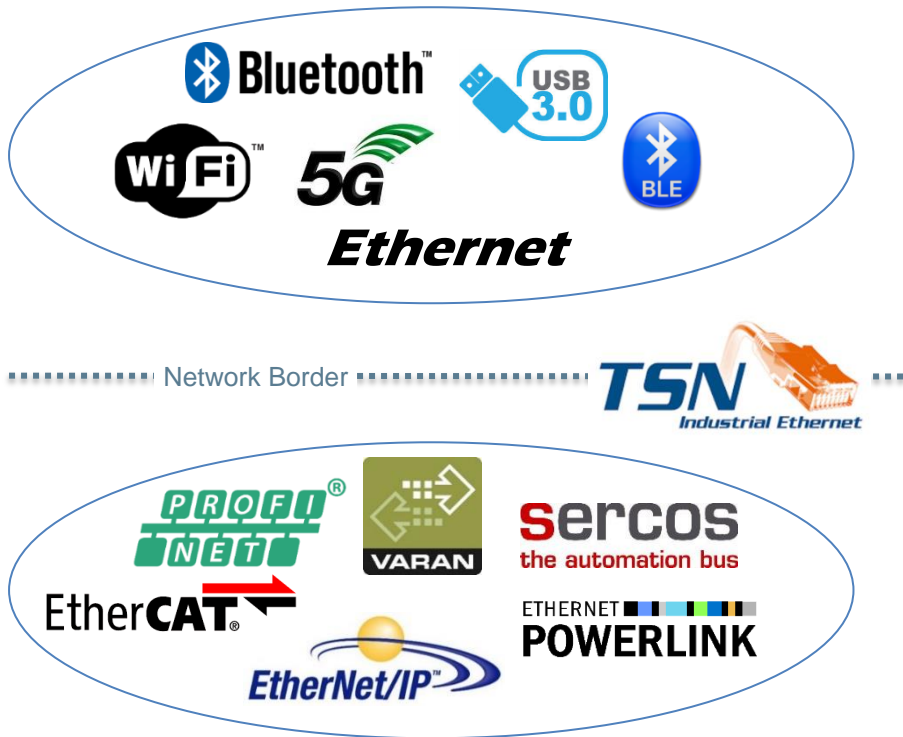


Embedded Sensors



2017

2024



2017
CAGR

- Wireless **32%**
- Industrial Ethernet **22%**
- Fieldbus **4%**

New Communication
Standard I4.0

OPC UA
(Platform I4.0)

Embedded Sensors

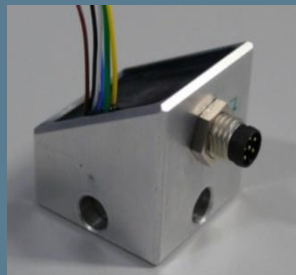
Pressure



Structure Born Sound

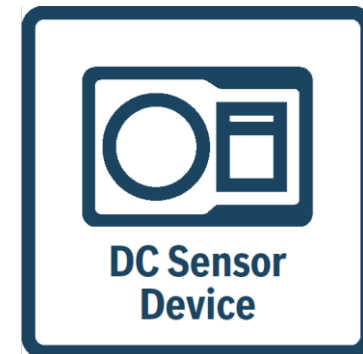
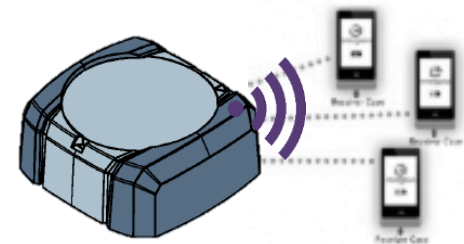


Internal Gear Pump



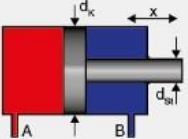
Structure Born Sound Sensor

Connectivity



Industrial Hydraulics – Commissioning Intuitive Engineering Tool, Easy to Use

Cylinder type
Differential cylinder



Axis position
 Horizontal
 Standing
 Suspended
 Angle specification

Inclination angle of axis (α) Deg
 Moved mass kg

Cylinder data
 Piston diameter (d K) mm
 Rod diameter (d St) mm

Piston area A mm²
 Piston area B mm²
 Current area ratio
 Cylinder stroke mm

Take account of dead volume
 Variant Pipes Hose assembly

Line diameter A mm
 Line length A mm

Startup Wizard

Communication Wizard

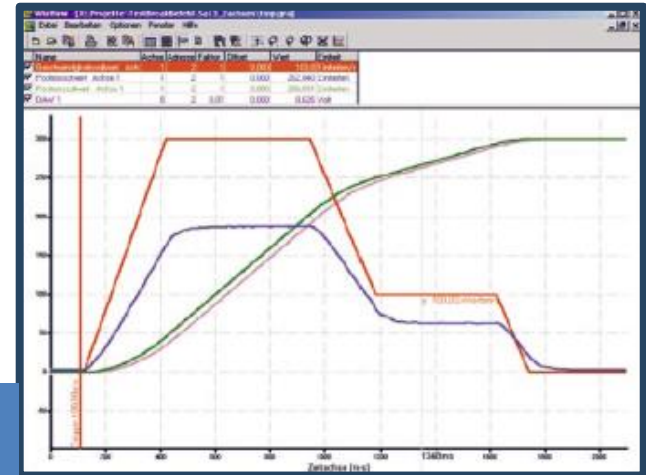
Commissioning Assistant

Program Debugging

Data Logging

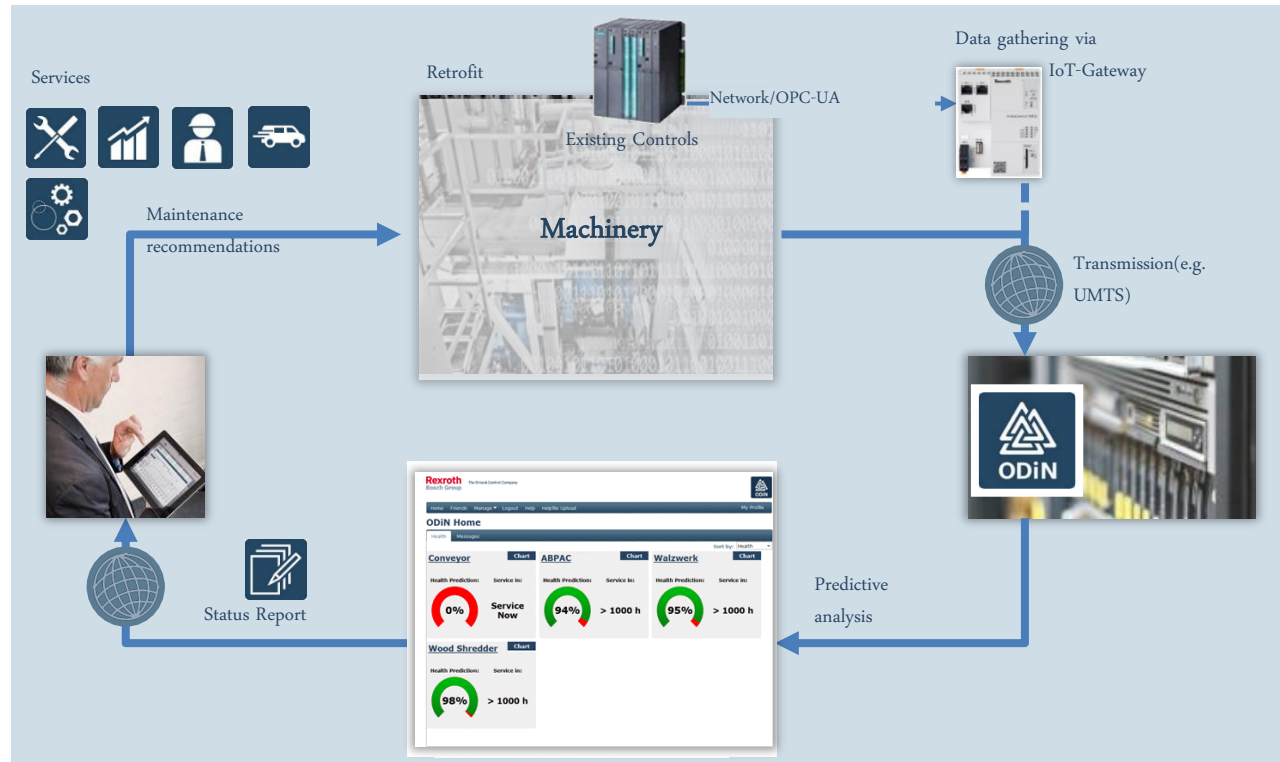
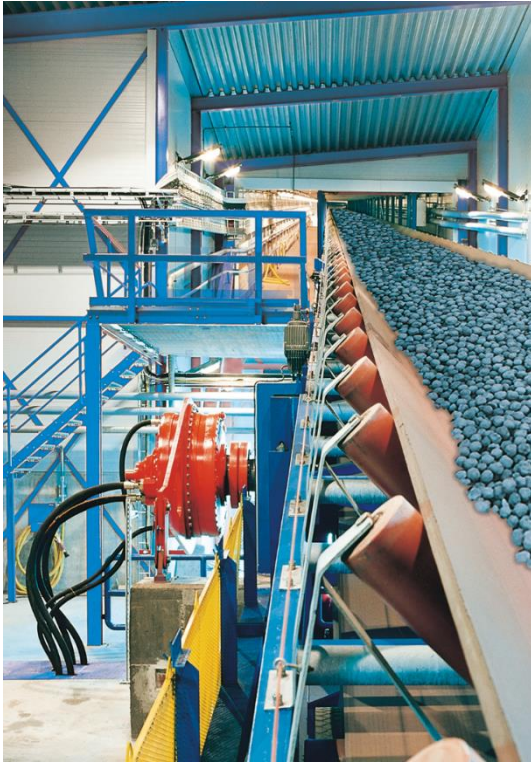
Online Oscilloscope

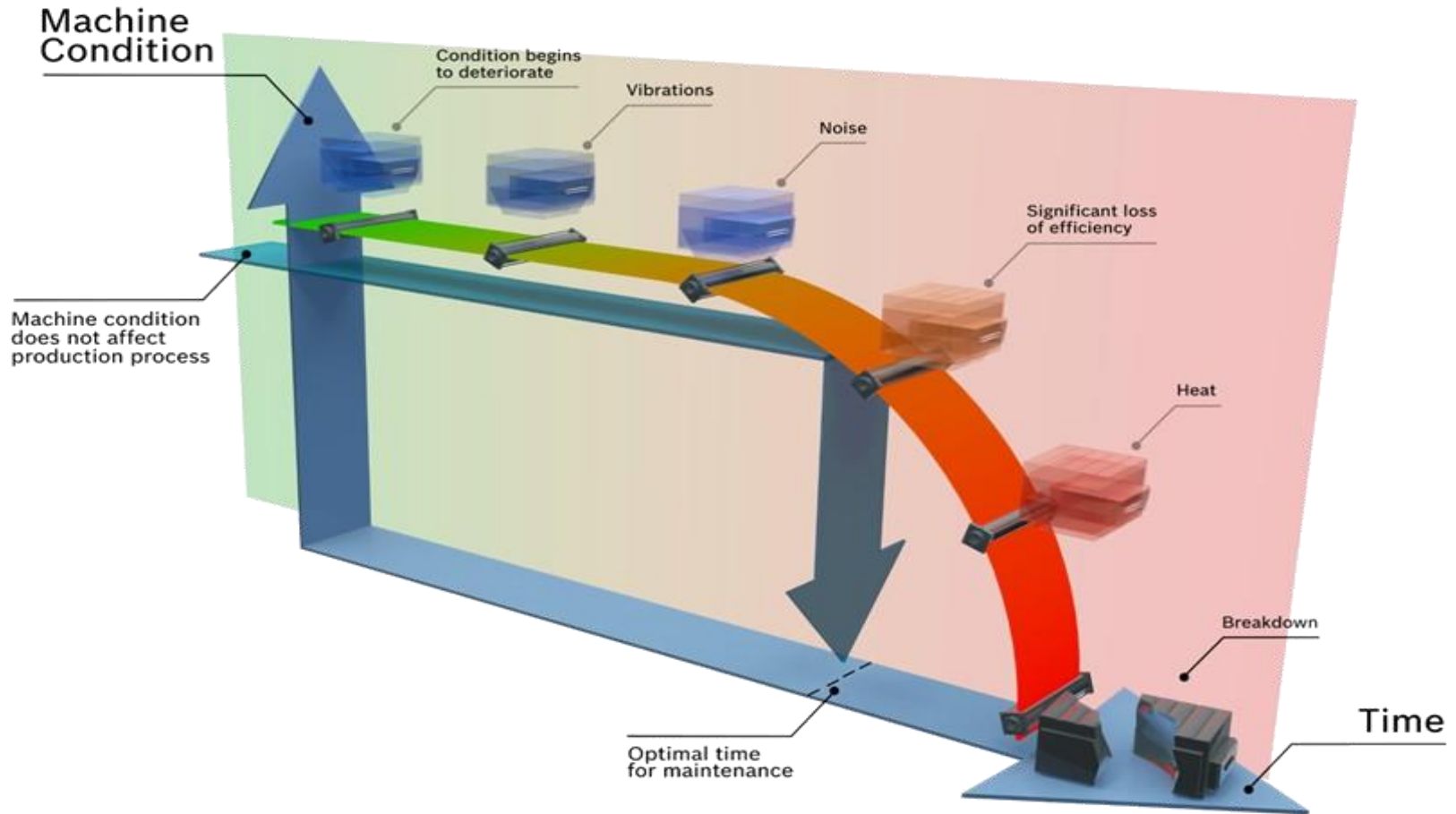
Wizards
and
Tools



Industrial Hydraulics – Production

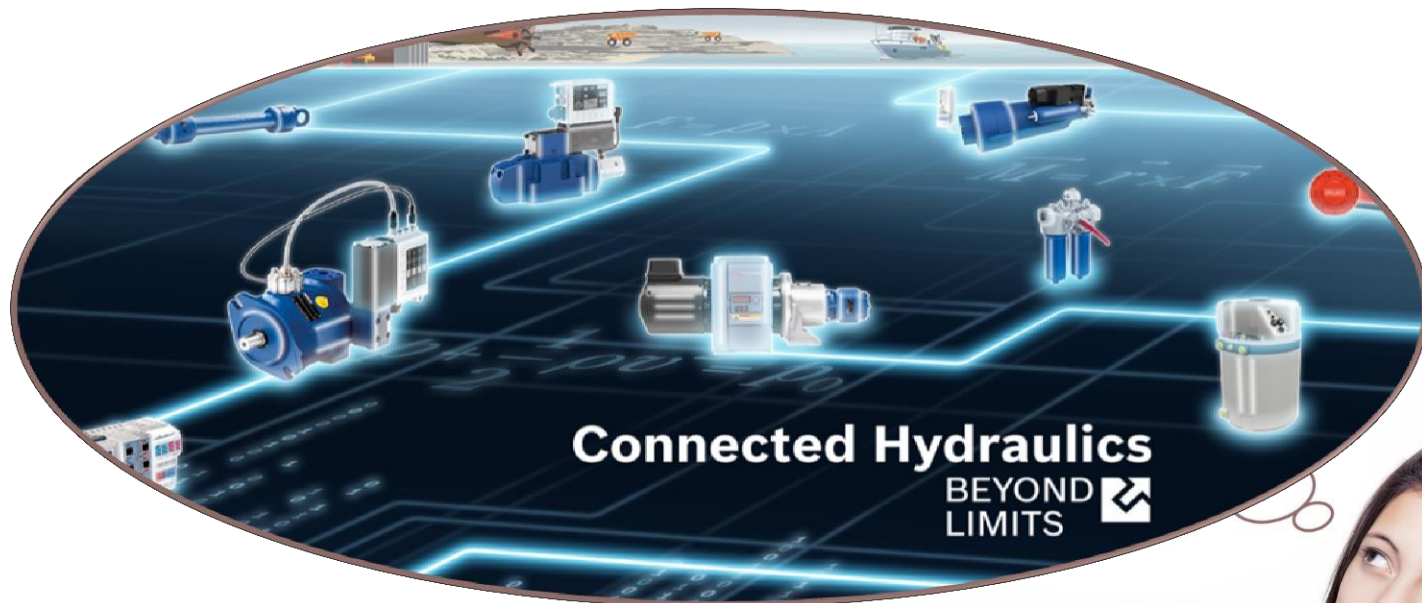
Use Data – Increase of Machine Availability





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Hydraulics of the Future



Thank you for your attention!

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