EILAT - 2018

All the power of the iCloud at the service smart installations

Montserrat Grima - Drives Service Manager Mediterranean Area

Agenda

The digital revolution – coming now to industrial markets

ABB's industry leading digital solutions

What it takes to win in digital

The ABB Ability™ platform

What is the Digital Powertrain?

Predictive Maintenance

Cases and examples

Conclusions

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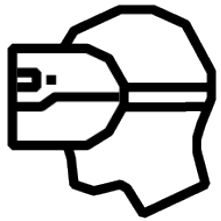
Digital technologies are driving new innovation in industrial markets

Media is focused on B2C but the “killer app” is in B2B

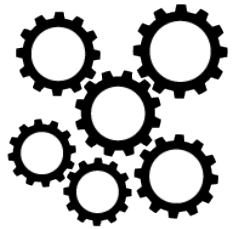
Virtual/augmented reality



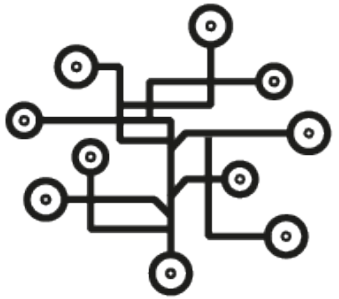
Software-defined machines

Machine learning

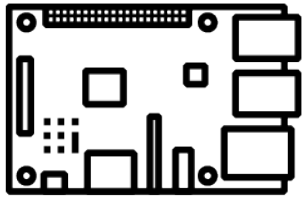
Time-sensitive networking



Big data



Inexpensive computing

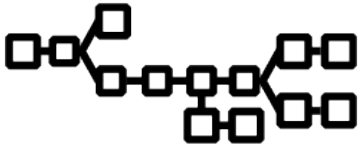


Cloud computing

Cybersecurity

Connectivity

Blockchain



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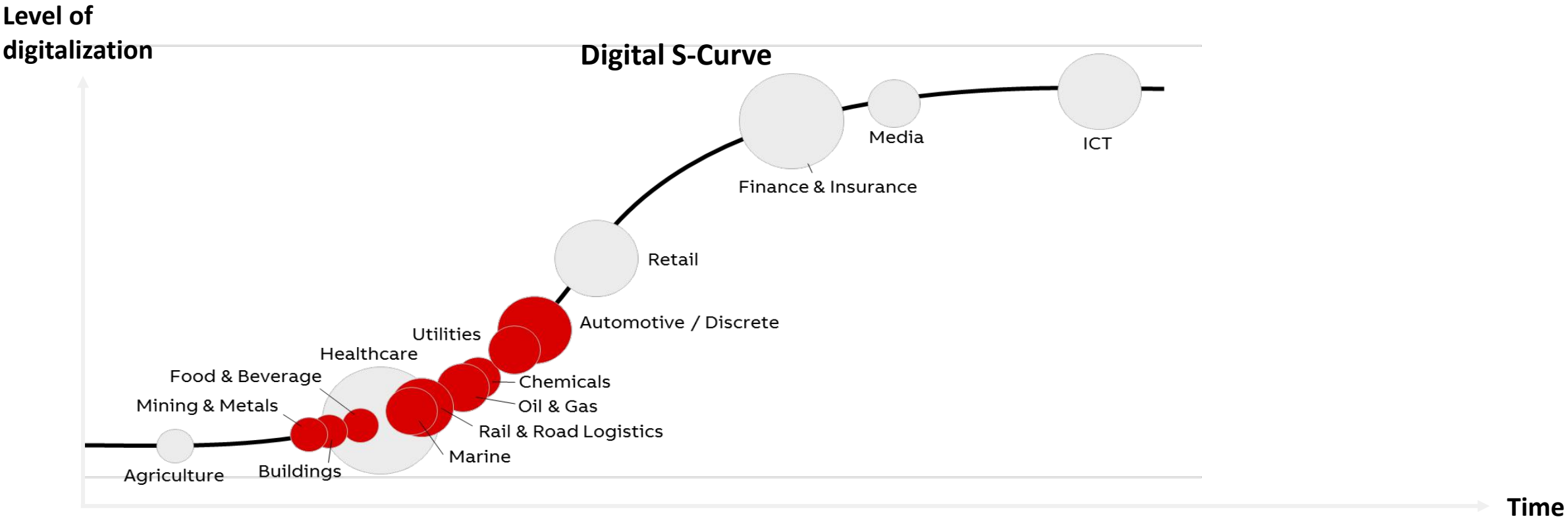
Industrial markets primed to adopt digital technologies

Computing + connectivity + cloud + analytics set to unlock value



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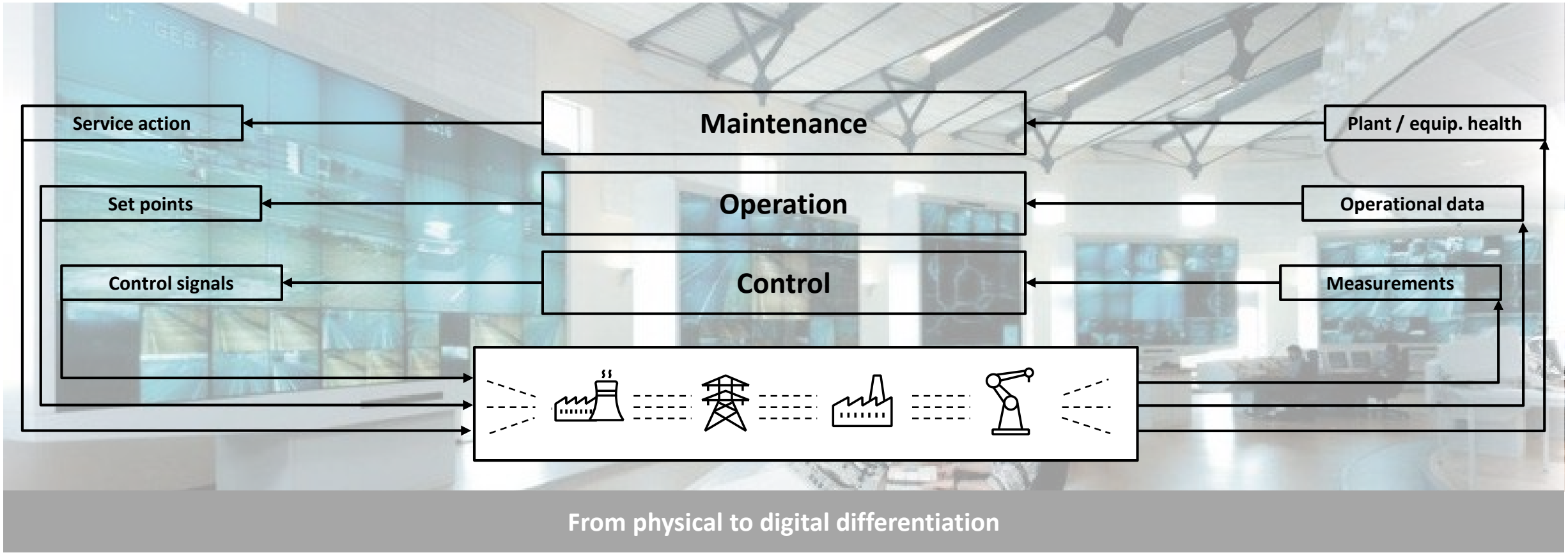
Note: relative size of industry for advanced economies
Source: ABB analysis

What does it take to win in digital?

Mastering the control room



From physical to digital differentiation

ABB Ability™: industry-leading digital solutions

Our expertise

Information

Technology

Know-how

ABB Ability™

Digitally connected products & services

Customers

Uptime

Speed

Yield

Safety

Security

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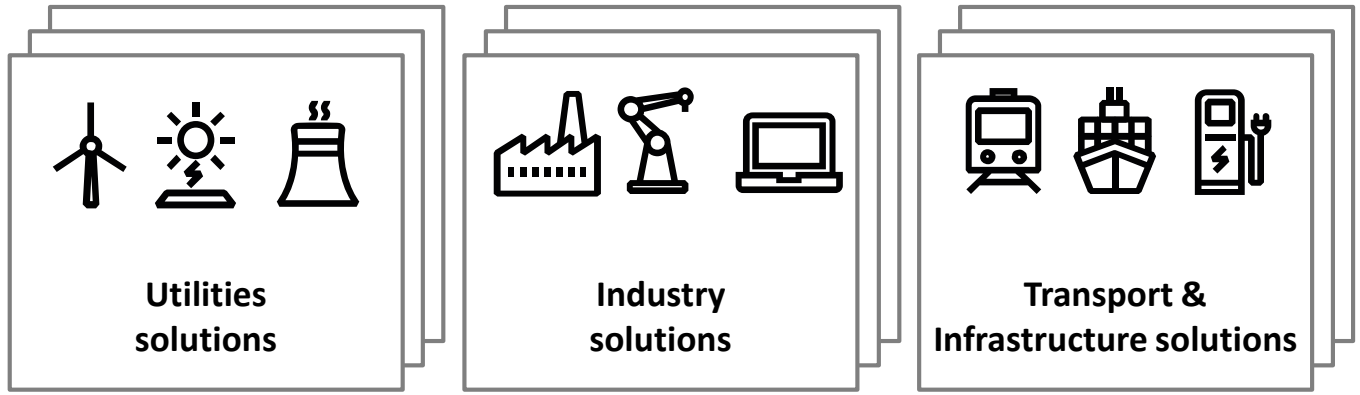
ABB Ability™ solutions & platform

ABB Ability™



Platform
(common technologies for device, edge, and cloud)

Microsoft

What Delivers customer benefit (uptime, speed, yield…)

How Provides ABB with efficiency and scale

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How ABB Ability™ solutions deliver value

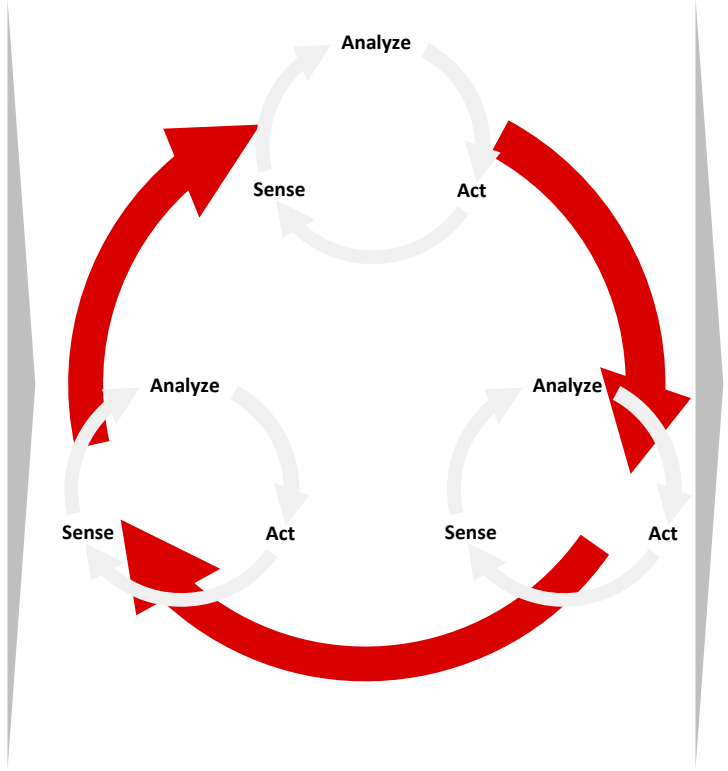
The incremental learning…

Together

Do better

Do more

Know more

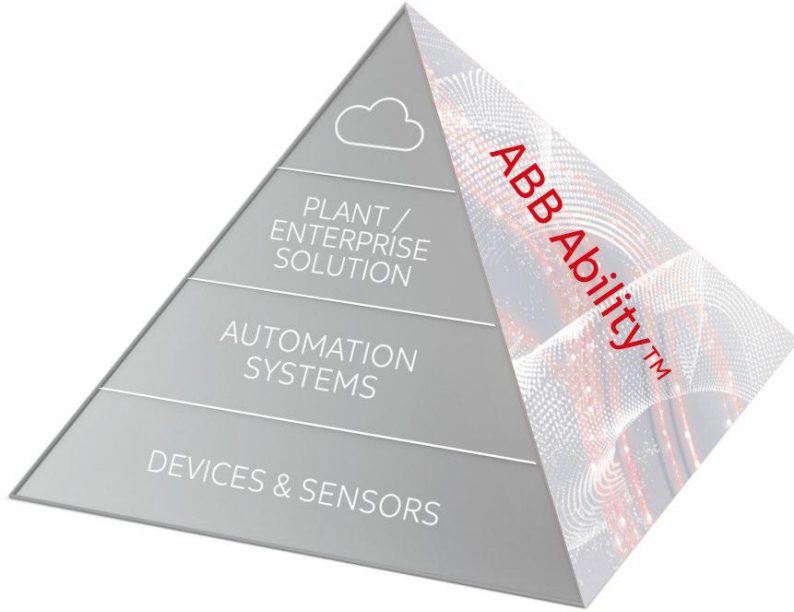


Collaborate

Optimize

Automate

Assess



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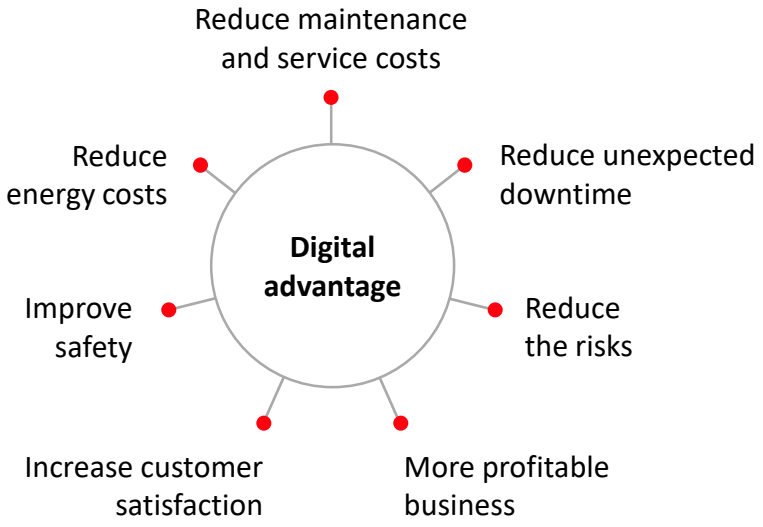
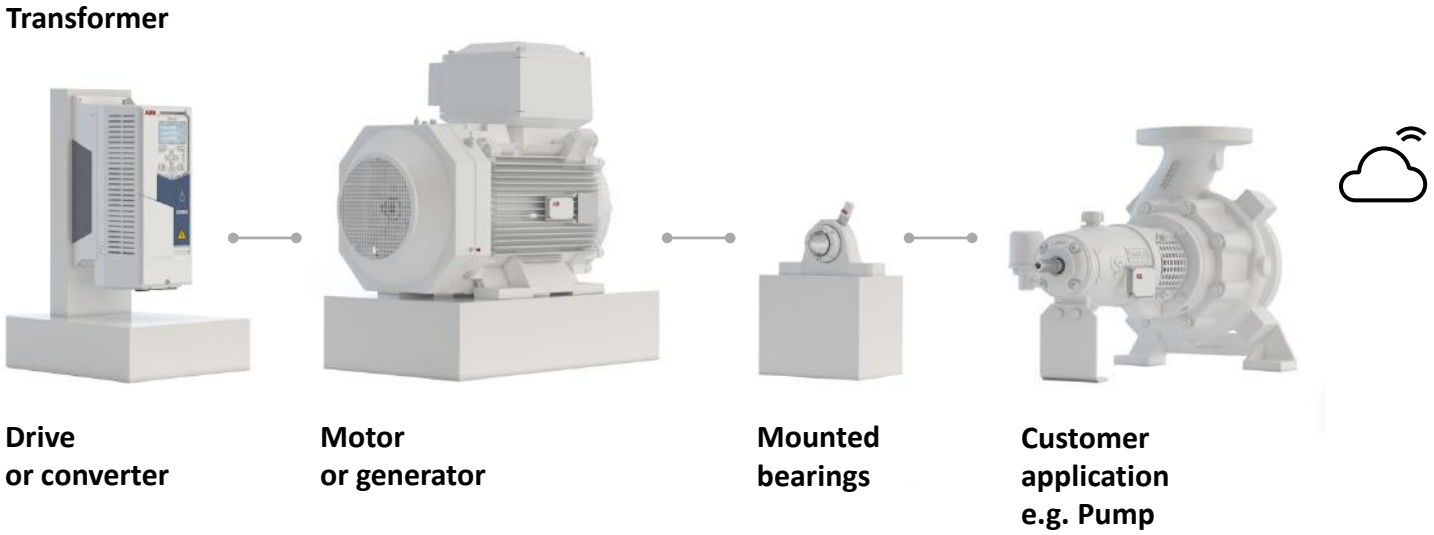
What is the Digital Powertrain?

Digital Powertrain

What is the Digital Powertrain?





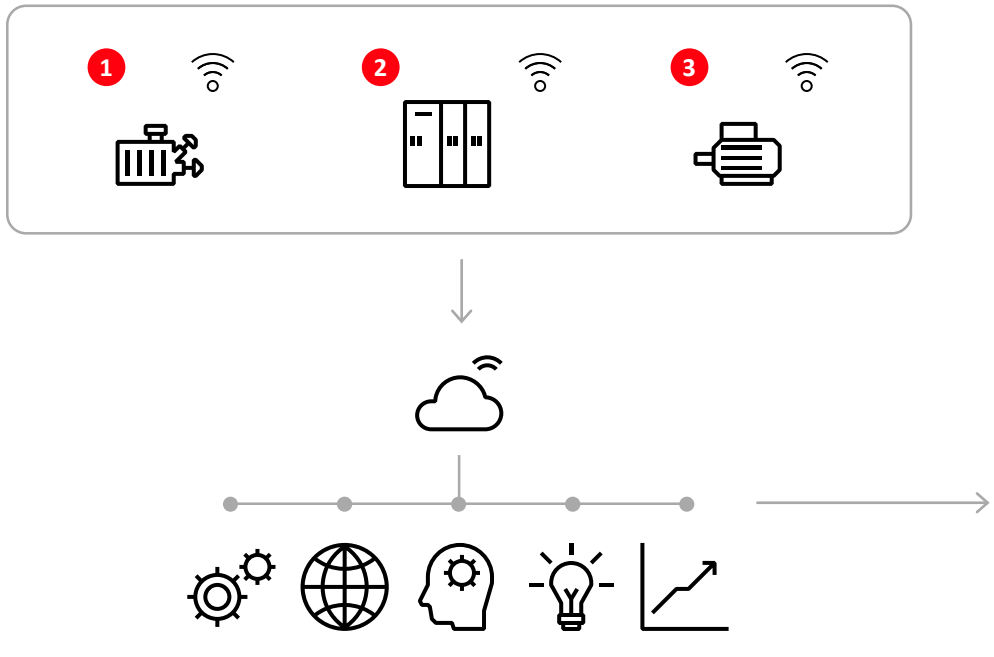
An intelligent powertrain, equipped with sensors and cloud connectivity, comprises motors, drives, mechanical components including bearings, couplings and gearboxes, and applications like pumps, fans and compressors

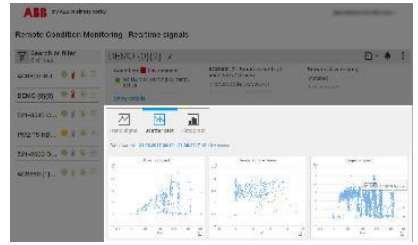
Intelligent electrical drivetrain

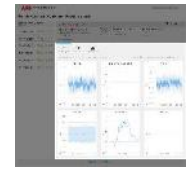
Monitoring the whole Powertrain

Digitalizing electrical drivetrain products

1. **Transformer digitalization**
   - Temperatures…
2. **Converter digitalization**
   - Voltages
   - Currents
   - Active and reactive power
   - Switching frequency
   - IGBT temperatures
   - Fault events
   - Warnings
   - Logger data…
3. **Generator/motor digitalization**
   - Temperatures
   - Vibration
   - Noise…







Besides the Drives, also other power train components are included to the condition monitoring

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Predictive Maintenance: learning from monitoring wear-out and stress

Example

Aging of critical components

Stress caused by Environment

Stress caused by Usage

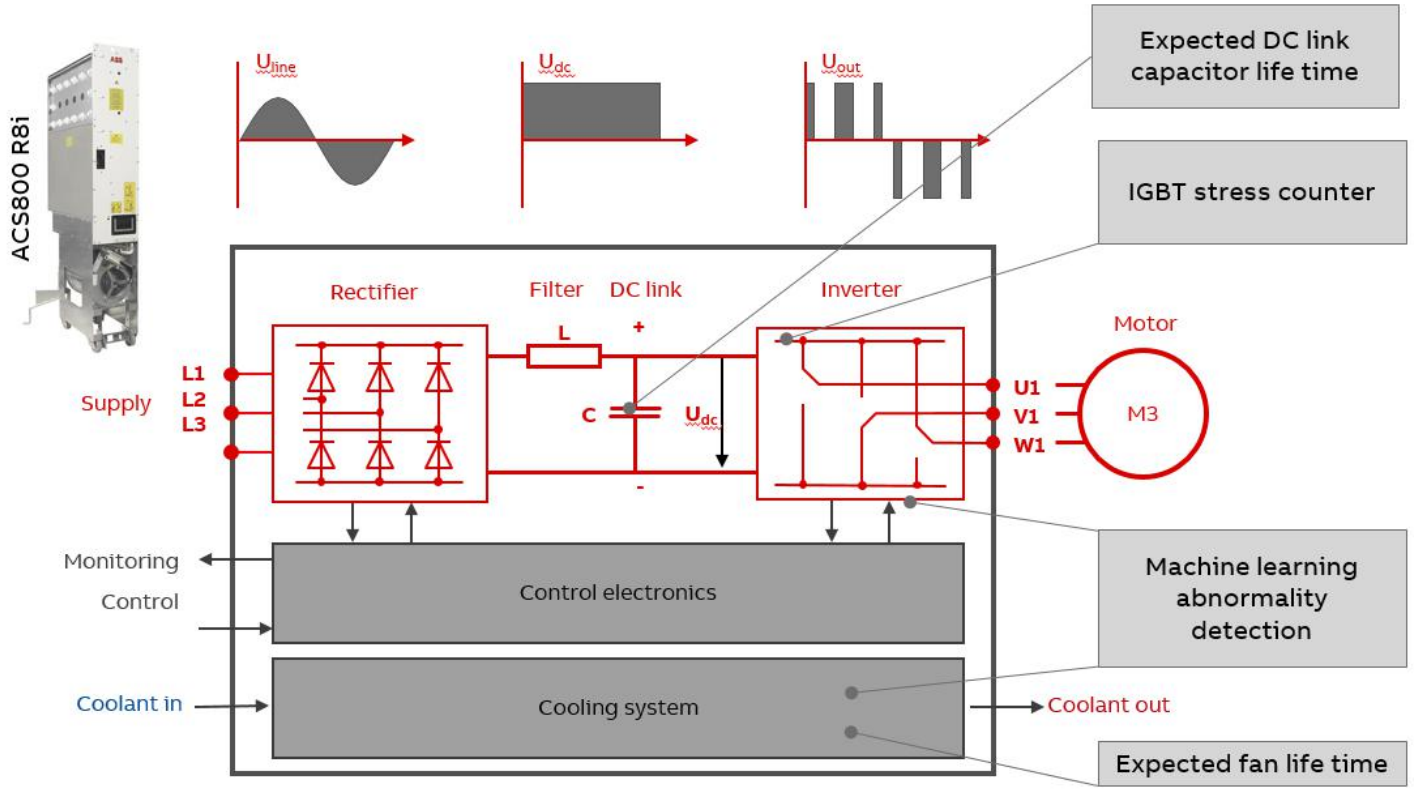
Avoid downtime with the help of Advanced algorithms

Peace of mind with ABB Expertise standing right by your side

Cloud Computing gives unique process insight

Algorithm overview

Example



1. The lifetimes of the DC capacitor and main fan are estimated using statistical lifetime models.
2. The IGBT lifetime is estimated based on the case and junction cycles.
3. An experimental machine learning model detects abnormal cooling and IGBT wear out using neural network

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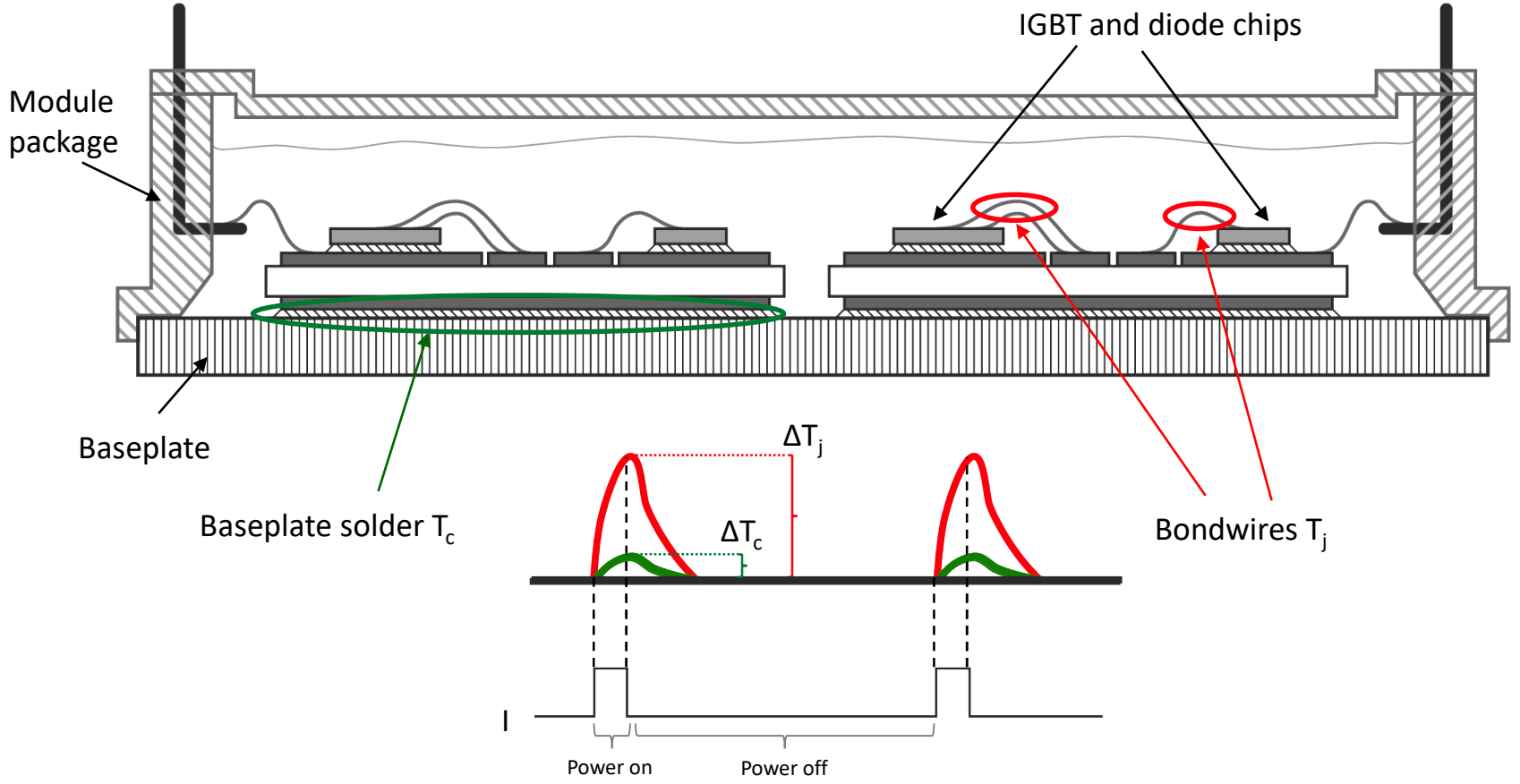
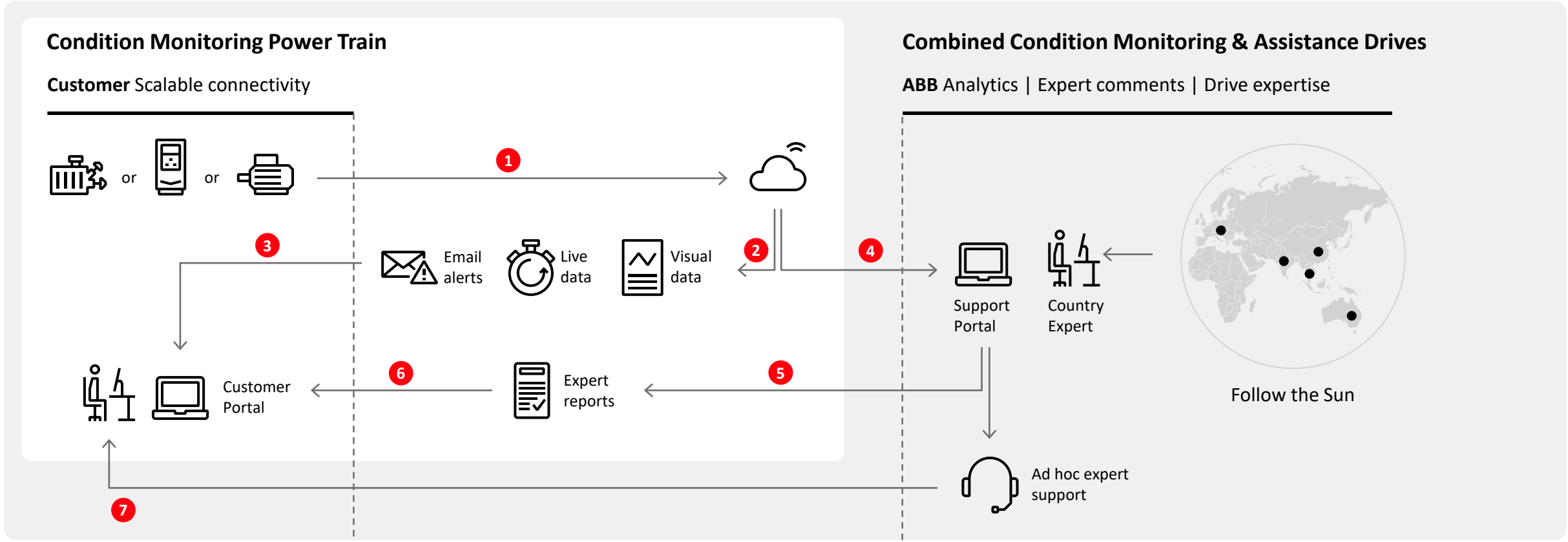
Temperature cycling in the IGBT module

Example



Multiple Scalable Connectivity Options for end customers

ABB Ability™ Condition Monitoring for powertrain & ABB Ability™ Remote Assistance for Drives



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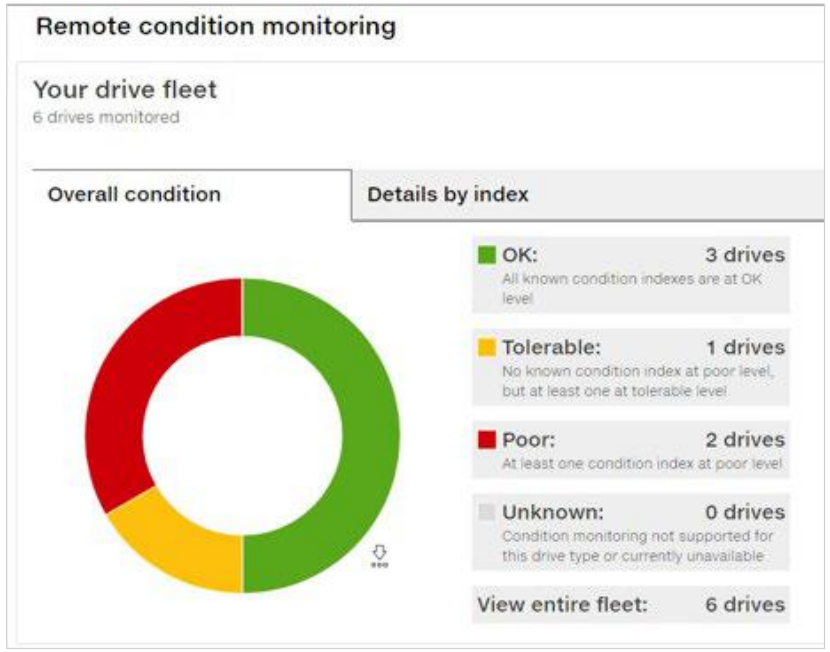
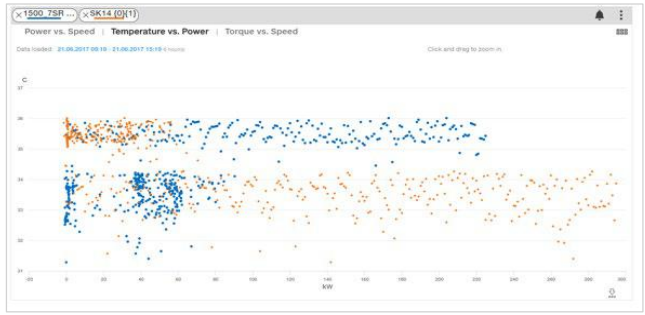
User friendly Web portals & reports

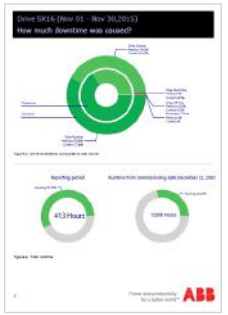
Web & mobile portals for easy access to information

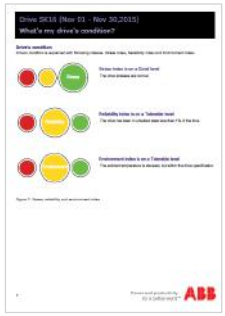
Visual & interactive indicators

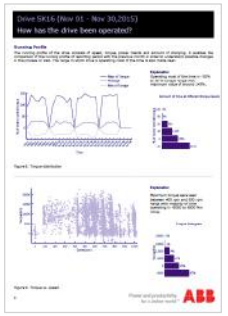




Reports at the push of a button





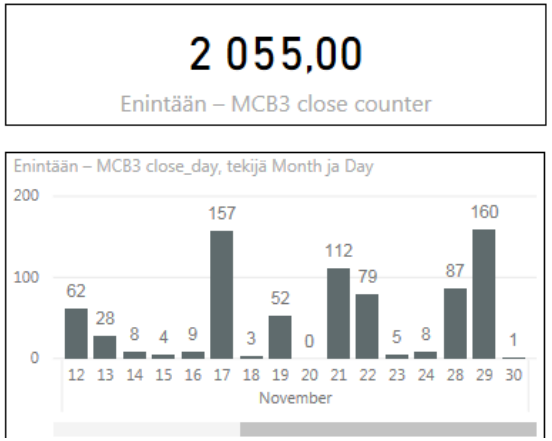


Customer can also get automatically notifications on drive faults, warnings, limited performance, parameter changes and exceeding set control board, IGBT and cooling air temperatures

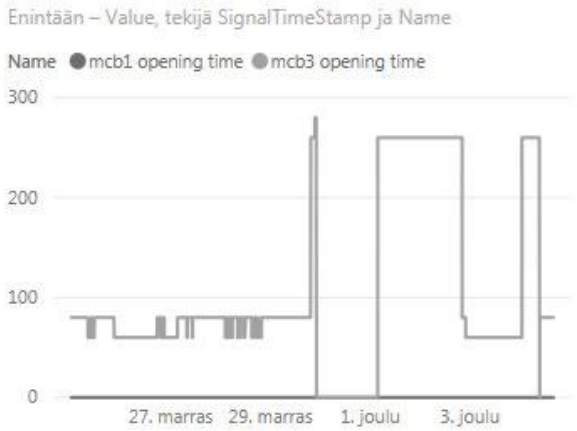
Digital advantage delivered through ABB Ability™ Digital Powertrain

Example 1

From data



Counters of Stator Contactor, Grid Air-circuit Breaker



Signal of Opening delays

To Analysis and recommendation

- Application has too many start-ups per day
- Opening of the stator-circuit contactor/breaker are gradually increasing, from 80msec to 260msec
- Application has a tendency to have frequent grid ON/OFF connections especially when the application operates near to its grid synchronization range
- Impact:
  - The contactor/breaker is starting to wear-out
  - Overriding control system (PLC) and its control logic should be inspected

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CASE

Steel Plant with critical drives

Remote Condition Monitoring as a basis for Predictive Maintenance

Customer

- Steel mill in distant location
- Remote Condition Monitoring since September 2015 for Pump TSCR (Thin Slab Casting Rolling)

Success case

1. Temperature difference between parallel power modules was detected
2. Customer was alerted
3. Check done on-site by customer and ABB engineer found dust accumulation near the heat sink, and cooling fan not running at needed speed
4. Situation was corrected and temperature returned normal

Benefits

- Failure prevented
- Failure would have caused 3 - 5 hours of unexpected downtime, cost between 50 – 100 kUSD per hour.
- Customer **saving up to 0.5 MUSD** just on this single case

Predictive maintenance leading to major savings.

Conclusions

- ABB Ability Digital powertrain with connectivity, data analytics and ABB expertise
- Uses the latest algorithms and machine learning technologies
- Manage and maximize performance of drives, motors, pumps and bearings
- Improve efficiency, safety, equipment uptime and production output, while reducing risks and costs

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