Entering a new era with digital technologies in HVACR

Frank Taaning Grundholm, Vice President HVACR sales ABB Motion
HVACR market overview

What drives the market

**Population increase & urbanization**
By 2030, population will reach 8 billion, 60% will live in cities. Urbanization requires investment in HVACR systems.

**Energy savings**
Governmental initiatives and directives, rising energy cost force building owners and OEMs to increase energy efficiency of equipment, process and buildings.

**Digitalization**
Increased usage of smart devices and wireless connectivity comes to all aspects of life including indoor environment control.

**Increasing living standards**
The world keeps evolving. Life standards become higher and people expect indoor environment in the buildings they work and live in to be comfortable and safe.
What drives HVACR towards digital

Technologies and innovations in the industry

- Virtual/augmented reality
- Software-defined machines
- Artificial intelligence and machine learning
- Time-sensitive networking
- Inexpensive computing
- Cloud computing
- Cybersecurity
- 5G Connectivity
Era of smart buildings

Smart building ecosystem and HVACR as part of it

- Building solutions and systems including HVACR work hand in hand with each other
- They provide a holistic answer to modern building management
- Ecosystem incorporates cloud-based, cross-industry digital systems

30% reduction in operating costs with smart building solutions
How to digitalize building HVACR

Bringing HVACR system components into a whole

**Drive**
- Monitors energy consumption, speed, torque, current over the time to tell more about the application
- Drive health itself is monitored over control board temperature, internal fan work time, load on DC caps and IGBTs

**Motor**
- Through sensor, data on vibration, skin temperature, misalignment, bearing condition, number of starts, speed, operating time, etc. can be observed

**Pump**
- Through sensor, data on vibration, skin temperature, misalignment, bearing condition, looseness, blade problem, number of starts, etc. can be observed

**Bearing**
- Through sensor, data on overall vibration, kurtosis and skewness, skin temperature

**Cloud**
- Data collection and processing to accelerate efficiency, predictability and safety
ABB Ability™ Digital powertrain

Bringing HVACR system components into a whole

1. Choose the asset you want to protect
2. Install connectivity devices
3. Connect to a cloud-based system
4. Use services of the system
   - Remote assistance
   - Backup management
   - Alarm management
   - Offline data collection
   - Asset health
   - Predictive maintenance
5. Monitor and act
6. Get the process reliability and system productivity

Variable speed drive
Motor
Bearing
HVACR application
Smart sensor
Gateway
ABB Ability™ Digital powertrain

What is the overall powertrain condition composed of?

**Availability**
- OK
- Fault
- Warning
- Unknown

**Environment**
- OK
- Too high, rapidly aging your drive
- Tolerable but somewhat warm
- Unknown

**Reliability**
- Faulted <0.1% of the time
- Faulted >1% of the time
- Faulted >0.1% & <1% of the time
- Unknown

**Stress**
- OK
- Too heavy, rapidly aging your drive
- Tolerable but somewhat heavy
- Unknown
Benefiting of HVACR system digitalization

Boosting efficiency, reliability and safety

- Having HVACR system component visibility – from applications like pump, to motor and motor control (drive) – allows to see the whole picture
- Predictive maintenance actions can be taken to avoid component failure in the future and keep critical HVACR processes running
- Seeing energy consumption application by application allows to optimize energy consumption across the whole HVAC system
- Maintenance becomes much safer and saves time – no regular inspections, no close interaction with electrical and rotating equipment, system component performance is constantly monitored

Up to 30% extended asset lifetime
Up to 10% higher system efficiency
Up to 70% less unplanned downtime
Up to 30% reduction in operating costs
Benefiting of HVACR system digitalization

ABB Ability™ Predictive maintenance: monitor, correct, optimize throughout system lifetime
In-building wireless communication

Why we need to specify wireless capability for HVACR system components

• There is no clear standard in buildings services for the wireless future
• It is however increasingly clear that a lot of new services will only be available, if the building supports wireless communication
• Without a clear standard, how do we specify and avoid significant pitfalls
• Avoid specifying a technology; today there are millions of devices available, but based on Bluetooth®, Wi-Fi, Zigbee and Z-Wave® as examples of some of the topologies applied
• Require flexibility to update, so that as needed, ex. 5G capability can be added, when relevant
Supporting the facility manager

Why we need a display on HVACR system components being part of IoT

• In spite of the drastic increase in digital services interconnected with each other and a cloud, many operators still rely on information available on the units

• We still cannot expect that connection only from a smartphone or BMS system is sufficient

• All larger control units should be equipped with a clear text display, so status, warnings and alarms can be communicated in clear text in local language
Thank You for attending this presentation

Don’t forget to collect your CPD certificate at the event from CPD collection area