Gerenciamiento digital de motores y VDF en media tensión
Gerenciamiento digital de motores y VDF en media tensión

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Jorge Quinteros
## Agenda

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Introduction</td>
</tr>
<tr>
<td>2</td>
<td>SIDRIVE IQ View - Augmented Reality (AR) Technology</td>
</tr>
<tr>
<td>3</td>
<td>SIDRIVE IQ - Value add for your daily business</td>
</tr>
<tr>
<td>4</td>
<td>Switch to Remote Initiative – Virtual Factory Acceptance Test</td>
</tr>
<tr>
<td>5</td>
<td>Q&amp;A</td>
</tr>
</tbody>
</table>
Trends in Mining
Our SIDRIVE IQ Connectivity Solutions
for our MV Drives and HV Motors

SIMOTICS

SIMOTICS HV C

SIMOTICS Connect 600

SH 315

P 150 kW

... 3,2 MW

SIMOTICS HV M

SIMOTICS HV HP

SINAMICS

SINAMICS (MV)

SINAMICS Connect 500

P 180 kW

100 MW

Connectivity Performance

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MV Drives and HV Motors: Siemens Large Drives Applications

HV-M Motor 1560 kW 4.0 kV slurry pump application (gearbox)

H-Compact Motor 1870 kW 4.0 kV High pressure grinding rolls application
Trends in Mining
SIDRIVE IQ VIEW – iOS App

Overview

SIDRIVE IQ View is an iPadOS App that uses Augmented Reality (AR) Technology.

With the App you can visualize configured motors from the Drive Train Configurator www.siemens.com/dt-configurator

It enables you to view your configured motor in your environment and get a real impression of the motor even before it is produced.

Now available in the Apple App Store for free!
SIDRIVE IQ View
Benefits of our latest App

- Get real impression about the configured motor
- Imagine real motor dimensions
- Easily consider terminal box locations
- Avoid misconceptions early
- Short configuration time
Trends in Mining
SIDRIVE IQ
Value add for your daily business
Johannes Endres, IIoT Digitalization Specialist
New business models in the internet age are disrupting complete markets.

- From bookstore … to e-book
- From record store … to streaming
- From hotels… … to self rental
- From taxi … to ride sharing
“Digital is the main reason just over half of the companies on the Fortune 500 have disappeared since the year 2000.”

- Pierre Nanterme
CEO Accenture

“The Very Management Practices That HaveAllowed [Companies] To Become Industry Leaders Also Make It Extremely Difficult For Them To Develop The Disruptive Technologies That Ultimately Steal Away Their Markets.”

The Innovator’s Dilemma - Christensen
Focus on digitalization efforts can result in game-changing operational improvements

Digitalization by Industry

<table>
<thead>
<tr>
<th>Industry</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telecom</td>
<td>1.82</td>
</tr>
<tr>
<td>Automotive</td>
<td>2.05</td>
</tr>
<tr>
<td>Electronics</td>
<td>2.35</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>2.70</td>
</tr>
<tr>
<td>Chemicals</td>
<td>3.21</td>
</tr>
<tr>
<td>Minerals</td>
<td>3.33</td>
</tr>
<tr>
<td>Oil &amp; Gas</td>
<td>3.82</td>
</tr>
</tbody>
</table>

Digitalization Opportunities and Benefits

- Asset management and business analytics
- Remote Operation
- Industrial Internet of Things (Web of Systems)
- Cloud applications
- Big data analytics

Source: McKinsey and Co; Accenture; 1 = high, 2 = medium, 3 = low, 4 = rudimentary

$80B

Will be spent in the next 24 months on operational efficiency...

-25%

... that could lead to reduction in OPEX if smartly spent on digital...

8%

... and produce game-changing field recovery rates...

+11%

... resulting in sustained profit increase
Maintenance Approach vs. Holistic Approach to Digitalization in Drive Systems

Most suppliers currently offer the support and maintenance aspect of digitalization for drive systems. Siemens takes a more holistic approach.

Remote Assistance
- Technical support upon request

Condition Monitoring
- Remote connection
- Condition Monitoring Portal

Predictive Maintenance
- Predictive analytics & active monitoring
The Future of Digitalization

By implementing digital solutions across the three essential pillars of any successful operation: **efficient plant processes, intelligent products and digitized service**, users can increase availability and enhance reliability like never before.
Siemens Large Drive Applications Business currently offers complete Drive Systems and Solutions for the industry.
Digital “abilities“ is the theme … … for the next product life-cycle of HV/MV drive systems & solutions

Transformation of product / offering into the next era

Transformation of organizational capabilities
Digital Abilities
Available in our drive systems and solutions
Developing Smart Products for the Next Generation of Operation

1 Superior HMI & Advanced Diagnostics
   - New HMI offers advanced diagnostics including:
     - Summary of line-side status including input voltage, current and power
     - Transformer Temperature
     - Temperature of the hottest cell inside the drive
     - Summary of the motor’s performance, voltage, current, speed, torque and power
     - Trend up to 8 custom values on a single graph, converter failure

2 Troubleshooting Mobile Technology
   - Gives instant access to years of accumulated drive knowledge, helping to more efficiently and accurately diagnose any problems
   - Provides troubleshooting steps specific to the faults and alarms indicated by the drive’s keypad or HMI
   - Easier to contact CS with automatic service requests initiated by the push of a button.

3 Environmental Condition Monitoring Technology
   - New ‘smart’ cell technology for medium voltage drives equipped with sensors enabling monitoring of:
     - Cell Temperature Ambient
     - Cell Humidity
     - Cell Pressure
     - Arc Flash Detector
     - IGBT Heatsink Temperature Feedback

4 Monitoring Capabilities Integral To All Drives
   - Optimized maintenance activity and maximum availability to increase productivity, across the entire life cycle
   - Modules record relevant operational data via sensors and communicate that information to the cloud.
Developing Smart Products for the Next Generation of Operation

1 Bearing Technology
   Roller Bearing
   - Measurement: Envelope of vibration acceleration, temperature
   - Detection of: Inner and outer bearing ring damage, cage damage, ball damage, over-temperature
   - Possible consequence: Bearing damage, motor failure

   Sleeve Bearing
   - Measurement: Shaft displacement, oil temperature
   - Detection of: Oil whirl, oil temperature, shaft vibration
   - Possible consequence: Bearing damage, motor failure

2 Rotor Technology
   - Measurement: Speed, amplitude of vibration velocity (via shaft vibration)
   - Detection of: Rotor unbalance
   - Possible consequence: Bearing/rotor damage, motor failure

3 Cooling System Technology
   Air/ Water
   - Measurement: Temperature, pressure, flow
   - Detection of: Cooling problems
   - Possible consequence: overheating

4 Winding Technology
   - Measurement: Partial discharge, load profile, temperature
   - Detection of: Insulation damage, overload
   - Possible consequence: Short circuits, over-heating (hot spots), motor failure

5 Stator Technology
   - Measurement: Amplitude of vibration velocity
   - Detection of: soft foot, imbalance, misalignment
   - Possible consequence: Bearing damage, motor failure
How do you design and operate your Drive Systems for its lifecycle?
How can Digitalization enhance “lifecycle” value?

**Important questions around your digitalization journey?**

- Do I know and **understand the equipment** I own and operate?
- Do I have products and or parts in my fleet that are/will soon become obsolete?
- **Do I have the spare parts I need** and is the amount appropriate to address my risk of prolonged downtime?
- **Do I know “as-in-service” status** of my products?
- Do I spend my maintenance budget on what's important and needed to help reduce the risk of equipment failure?
- Can a product - from the beginning - bring **value into Total Cost of Ownership**?
- Do I have a centrally coordinated, data driven operating methodology?
Lifecycle view from Customer and Siemens perspective

Leveraging Siemens software

Process & plant design
Providing product data, CAE & simulation models for the design and optimization of the plant/system

Engineering & Commissioning
Detailed product engineering, commissioning products with Data Matrix Code & the Digital Twin

Operation
Fleet management, analytics and KPI’s for health supervision & performance optimization

Service
Enabled life-cycle services & performance/outcome-based contracts

Customer self-designed apps/service
Cloud to cloud interface
Stand-alone or integrating LDA digital products

Accelerating plant design and reducing effort

Reducing cost and time in engineering & commissioning

Increasing up-time and performance optimization

Reducing maintenance and TCOs

SIDRIVE IQ powered by Mindsphere

Digital Product Twin
Digital Performance Twin

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LDA DB
Fleet Management combines static and dynamic data in a “one-stop shop” solution

Remote Monitoring + Configuration Management

Dynamic Data
- Dashboards
- Analytics
- Diagnostics

Static Data
- Configuration
- Spare Parts
- Obsolescence
- Maintenance

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What does a Digital Solution mean for your Drive Systems lifecycle?
Overview
Digital portfolio for your Drive System

SIDRIVE IQ

<table>
<thead>
<tr>
<th>VFDs</th>
<th>Motors</th>
<th>Gearboxes</th>
<th>Equipment</th>
</tr>
</thead>
</table>

The Siemens IoT digital service combining asset connectivity, on-line SIDRIVE IQ software (SaaS), and Rapid Response support

Available now

SIDRIVE IQ Troubleshoot
Mobile App for VFDs

GH180 HMI with Advanced Diagnostics

Partner offerings

IQ Ready
IQ Connect

SIDRIVE IQ

Online Software

IQ Services
SIDRIVE IQ
Bringing all the worlds together captures value for customers
What are the key drivers to start implementing IIoT? Knowing what, when, how and who

Typical customer requirements and objectives

Reduce non-scheduled production downtimes …

Accelerate troubleshooting in case of unexpected downtime …

Facilitate maintenance planning to secure high degree of performance and safety …

Our answers with SIDRIVE IQ & fleet life-cycle management services

… through continuous health indicators & decision support-information
- Early detection of abnormal conditions in physics of drive system and its components

… through rapid response & diagnosis capability
- Anytime / anywhere access to measurements, KPIs, logs and machine experts for root-cause analysis

… through transparent documentation for preparation of scheduled on-site maintenance
- Condition-based prescriptive maintenance recommendation measures
- Aggregated trends and history

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Combing state of the art AI with human experts!
Creates impact for your operations

Expert Assistance “Rapid Response/Reactive”

Expert Diagnostics “Preventive”
Demo Video
Creates impact for your operations
How do we differentiate and bring value?
Cybersecurity along implementing IIoT
Deliver a holistic concept tied into existing customer requirements

**Information Security / Data Privacy**
Information Security requirements audit / certification, Privacy by Design review for components

**SI / Security Vulnerability Monitoring and Handling**
Software component repository and monitoring lists. Security vulnerability notifications. Security Update management

**Security Testing**
Security verification and validation of components to ensure that product/components meet specified security requirements

**Secure Architecture and Design**
Security architecture which satisfies security requirements. Threat and Risk analysis

**Secure Development**
Using security standards for development, security unit testing, peer review

**Secure Configuration & Hardening**
Apply secure configuration and hardening measures

**Holistic Security Concept**
Use of new technologies
To deliver new insights!

**New technologies are emerging that provide predictive intelligence technology based on high-sampling measurements of electrical and mechanical waveforms.**

- **384,000 data points acquired/second/asset (no sensors mounted on rotating assets)**
- **200 operating assets being monitored today and 1600+ through Fluke device**
- **AI-based algorithms continuously monitor machine health and performance**

Insights are derived using **machine learning** algorithms and **no need of additional sensors** *(e.g. vibration or torque sensors)*
We are beyond theory!
Creating value for our customers …

**Power Plant, fossil-fueled**
**1.600 MW, USA**

Accelerated issue resolution on Perfect Harmony GH180 drive, downtime reduction of 80% (< 75 min, instead of typically > 6 hours) & saved down-time cost of ~$120.000

**Hanson / Heidelberg-Cement Group, cement plant, United Kingdom**

Preventing downtime and initiated spare-part order for 4MW HV M SIMOTICS motor, estim. potential down-time cost of £500,000 per day

**Equinor, Hammerfest LNG plant, Barents Sea, Norway**

Uninterrupted production of 218 days and targeted extension of service interval from 3 to 4 years for 1x16MW, 1x32MW, 2x65MW compressor trains, estim. potential down-time cost of >4'EUR per day
To learn more? Reach out to your trusted Siemens partner

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