Integrated Simulation

Bridging Power and Process for Contextualized Insight and Optimization

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Agenda

• Introduction to Schneider Electric and Industry Background
• The Five Key Customer Capabilities
• Focus on Integrated Simulation
Schneider Electric: Software Integrating Power & Process

![Diagram showing Energy Management, Industrial Automation, Energy Transition, and Industry 4.0 with Sustainable and Efficient integration]

- **SUSTAINABILITY** + **EFFICIENCY**

- **Energy Management**
- **Industrial Automation**
- **Energy Transition**
- **Industry 4.0**

**Software**

**Electrification**

**Digitization**

**Life Is On**

**Digital Supply Chain**

**Sales**

**Marketing**

**Supply Chain**

**Associated Software**

**ONE**

**Revenue done through partners:** 60%

**Suppliers in production / direct procurement:** 23K+

**Investments Partnerships:** 50+

**EcoXpert program partners:** 4.2K+

**Service providers & partners:** 650K+

**System integrators & developers:** 42K+

**Alliances**

**Exchanges:** 100K+

**Collaborators:** 600+

**Offers listed:** 650K+

**Partnerships**

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Schneider Electric Digital Portfolio: AVEVA at the Core

**DESIGN**

- IGE+XAO Group
- AVEVA Simulation
- AVEVA E3D Design
- AVEVA AIM Asset Information Management

**BUILD**

- RIB
- AVEVA Enterprise Asset Management
- AVEVA Unified Supply Chain
- AVEVA System Platform, formerly Wonderware
- AVEVA Manufacturing Execution System, formerly Wonderware
- AVEVA Plant SCADA
- AVEVA Predictive Analytics

**OPERATE & MAINTAIN**

- Digital Applications & Services
  - Power
  - Asset
  - Sustainability
  - Cybersecurity

- AVEVA System Platform, formerly Wonderware
- AVEVA Manufacturing Execution System, formerly Wonderware
- AVEVA Plant SCADA
- AVEVA Predictive Analytics

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- Agnostic Operational Data Platform (collect, store, contextualize and share)
- Edge Control
- Connected Products

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Industry Challenges and the Energy Trilemma

A Complex and Fluid Global Situation leads to three clear and challenging priorities for Energy

- Global events and geo-politics have amplified power of supply side
- Sustainability & green energies investment: from weak signal to a major strategy change
- Reorganizations to keep up with energy transition
- Evolution in industry spending
- Digitalization: remote work & operations as new normal

CONTINUE PROVIDING STABLE SUPPLY
REDUCE ENERGY INTENSITY
DECARBONIZE
“Sell the Hole – not the Drill.”

-- Theodore Levitt, Harvard Marketing Professor
Energy Industry Needs Five Key Capabilities to Respond

**Insight-Led Sustainability**
Energy needs to be more effectively managed in terms of generation, distribution, supply and demand – while accounting for the wider commercial and environmental context.

**Integrated & Autonomous Operations**
Enables remote operations and helps reduce/eliminate remote site staffing; puts industrial operations in wider context enabling higher level analysis, optimization, collaboration and action.

**Advanced Analytics**
Unleash insights and actions not possible through traditional or solely-human analysis, or which would arrive much later; uncover trends in historical data, optimize operations, maintenance and production activities.

**Data Hub / Engine**
The capture, aggregation and contextualization of data from previously siloed domains as well as new sources of data.

**Integrated Simulation**
Optimization of design, engineering or operations at the confluence of Power and Process – to unveil new opportunities for energy and commercial efficiency.
A Digital Platform for Energies & Chemicals

Apps & Analytics
Enterprise Visualization and Collaboration

- Engineering data and documents
- HMI/SCADA, Historians
- Financial, ERP
- Weather, Market Data
- Maintenance and CMMS

Advanced analytics and artificial intelligence solutions

Industrial information platform

- Engineering Information
- Operational Information (Real time)

Edge Control

Connected Products

Customer Objectives

$ Efficiency

Sustainability

- Integrated & Autonomous Ops
- Insight-Led Sustainability
- Integrated Simulation
- Advanced Analytics
- Data Engine / Hub

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“Learn to see. Realize that everything connects to everything else.”

-- Leonardo Da Vinci, Renaissance Person – literally
ML Approach to Integrated Simulation: Energy & Yield Gains

Challenge:
• Regular shut-downs and flaring (18%) from operator attempts to drive efficiency at ethane cracker
• Energy loss and lower conversion yield
• 5 furnaces with 285kTon feed

Solution:
• End-to-end application for yield and efficiency optimization of ethane cracking (to ethylene)
• Application generates optimal set-points for operators, allowing conversion increase, reduction in fuel gas consumption, and avoidance of flaring and shut-downs

Benefits:
• 2.3% improvement in yield
• 7.8% reduction in fuel gas spend

Model temps and oxygen in a furnace using machine learning
Model constraints and objective function for derivative-free optimization
Solve for controllable variables in near real time (2 min lag)
Incorporate control system limitations and operator insights
Ecostruxure Digital Dynamic Simulation

Optimizing Electrical Energy Consumption & Improving Uptime in Operational Assets

Why this matters

10-20% of the unplanned SD are caused by electrical problems

Every electrical model does not take into account the dynamics of the process load

Power Dynamic Modelling usually based on stale / designed conditions not on the current operating conditions

Our solution and How we can help

Modelling the increase (or Decrease) of Electrical Load effects driven by Process Requirement with a integrated dynamic process and electrical study

Our proven impact

Energy- Efficiency Study Services / Deployment e.g: Improving Objective Functions:

Uptime Improvement, e.g: Evaluating all operating conditions and electrical responses; enriched situational awareness

Distinctive Technology

Proven market leaders; an innovative solution agnostic of DCS and EMCS vendor

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Integrated Simulation of Power & Process: Design Optimization

SE ETAP and AVEVA Process Simulation: Accelerating and Optimizing During pre-FEED and FEED

From:
Traditional, siloed and iterative engineering; the results of modifications within discipline-specific applications are repeatedly passed back and forth; optimization constrained by time and interfaces

To:
Accelerated, collaborative engineering; power and process working in sync; design optimization efforts vastly improved

Enabling:
During Pre-FEED: Accelerated evaluation of machine load flow in conjunction with the process flow diagrams:
During FEED: Better optimization of Power & Process plant design, leading more quickly to assurance of adequate machine power supply once mass balances have been calculated.
“Integrated Simulation is the critical link.”

-- Amit Kar, The Person Speaking to You Right Now
Integrated Simulation is the link between Power and Process

Advanced capabilities required to meet demands of the new Industrial Age; most customers not yet ready for these – with a few in the very early stages of developing these.

Fundamental capabilities necessary for the Digitalization journey; widely acknowledged and largely being addressed today with varying success.
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Please wait for the microphone.
State your name and company.

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Navigate to this session in the mobile app to complete the survey.

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