AVEVAWORLD

ACCELERATE INDUSTRIAL INTELLIGENCE

AVEVA WORLD MILAN, MAY 2026

Autonomous Operations

The Self-Driving Plant

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Agenda

Autonomous Operations:
The Self-Driving Plant

Autonomous Plant

- Industry 5.0
- AI and humans working together
- AI enabled decision making
- Humans can do more with AI alongside

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The Autonomous Plant

Like a Self-Driving Car: Two Types of Automation

- Adaptive cruise control with Lane Assist
- Steady state
- Advanced Process Control
- Real-time Optimization

- Fully self-driving
- Transient Conditions
- Auto-Optimizing
- Automatic Recovery from the Unexpected

Autonomous Operations Maturity

Control

Field

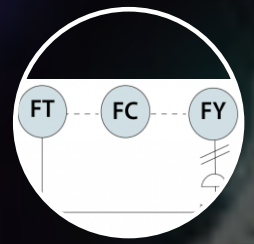
Production

100% Human
Manual Control

Level 0

100% Human
Decisions

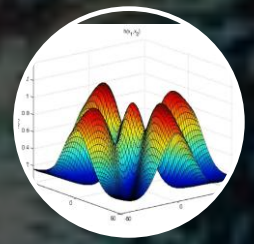
Level 1



Traditional
Automation

Level 2

Industrial
Automation



Advanced
Control

Level 3

System Level
Autonomy

Level 4

Full Autonomy

Level 5

Industrial
Autonomy

Autonomous Operations

Holistic view

- Control: Human supervised AI + simulation driven control
- Condition: Physics + AI real time monitoring and prognostics
- Operation: AI driven production, resource and sustainability optimization
- Safety: Through remote surveillance, reduced human exposure
- Scalable: Connected operations across disperse assets and locations

Control

Moving from Human-driven (manual) control to Human-supervised (AI + Simulation) control

Human Driven

- Human experience based
- Analog
- Entirely reliant on highly skilled operators
- Continuous manual control

Human Driven

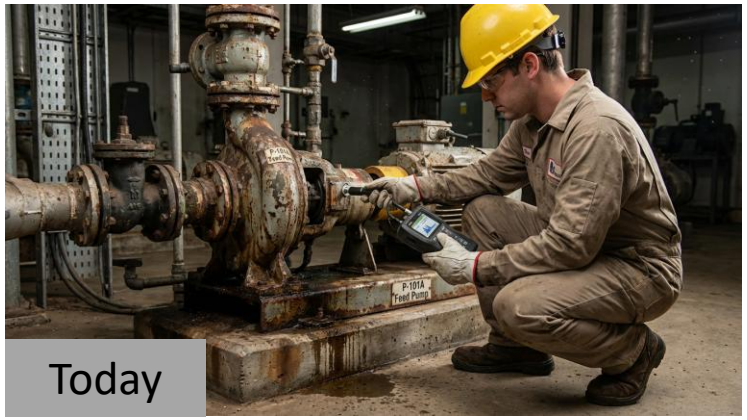
- Human experience based
- Digital
- Heavily reliant on highly skilled operators
- Frequent manual interventions
- **Risk of workforce skills gap**
- Poor operational consistency
- Sub-optimal process optimization
- Under-utilization of hardware

Human Supervised

- Machine (AI + Simulation) experience based
- **The plant / factory as a distributed Physical AI system**
- Intuitive interaction through voice and language
- Consistent optimization of the physical system under all operational situations

Condition

Moving from Human-expert maintenance decisions to Physics + AI-expert decisions



Human Expert

- Specialised human equipment reliability expert based
- Partial observability of equipment condition from installed IOT sensors
- Human monitoring via anomaly detection tools (eg Predictive Analytics) limited to high criticality assets
- Frequent field interventions / manual inspections (safety)
- Life use-age estimation challenging leading to over or under maintenance

Physics + AI Expert

- Physics and AI based on-line / real time monitoring for assets and systems
- Physics AI based insight to give **complete observability of condition**
- Accurate life **usage estimation based on physical laws**
- Fleet-wide prioritization of maintenance
- Minimize field intervention / manual inspection

Operation

Moving from sub-optimal human driven operations planning to AI optimized operations

Human Planned

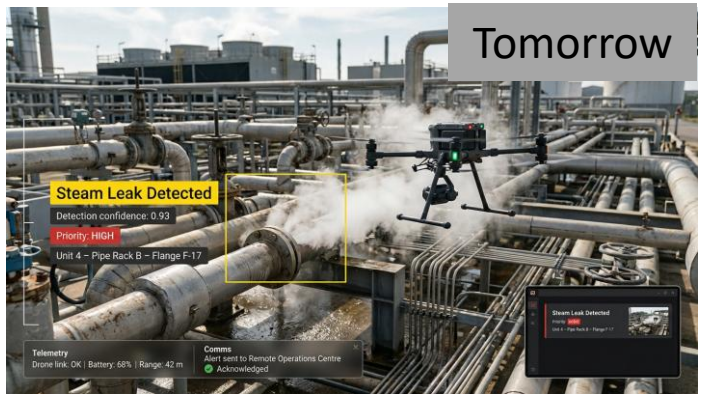
- Offline periodic planning
- Time horizon limited to now
- Limited forecasting capability
- Optimization for profit only

AI Planned

- Real time production planning, based on current market conditions
- AI and simulation based forecasts on various timescales
- Optimization levers for profit, sustainability, risk
- Interlinked with equipment / system health and life usage

Safety

Moving from frequent manned observations to automated inspection



Human in the field

- Exposure to hazards
- Human experience based
- Visual inspection based / mobile operator rounds

Robot in the field

- Reduced human exposure to hazards
- Image learned experience
- Remote inspection based
- AI prioritized
- Remote human validated

Scalable

Broader Applications View

Industrial Process Plants

Industries: O&G, Chemicals, Power

Need for AO: Skills gap, eliminate operator intervention, operational consistency, maximize hardware utilization

Control Problem: Manipulation of control elements (valves and motors) during transients and upsets.

Manufacturing / Factories

Industries: F&B, Life Science, AI Factory

Need for AO: Reduce human intervention, operational consistency, minimize wastage, minimize downtime, minimize energy consumption

Control Problem: discrete, continuous or batch system level control of material and energy

Networks

Industries: Power T&D, Water

Need for AO: Forecast demand, optimize supply for lowest cost / lowest emissions

Control Problem: Continuous optimization of production, storage and delivery

Materials Transport

Industries: MMM, O&G midstream

Need for AO: Automate movement and storage of material

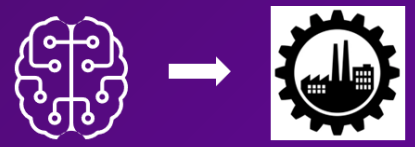
Control Problem: Maximize throughput, minimize energy consumption, optimize storage

Level 4 autonomy

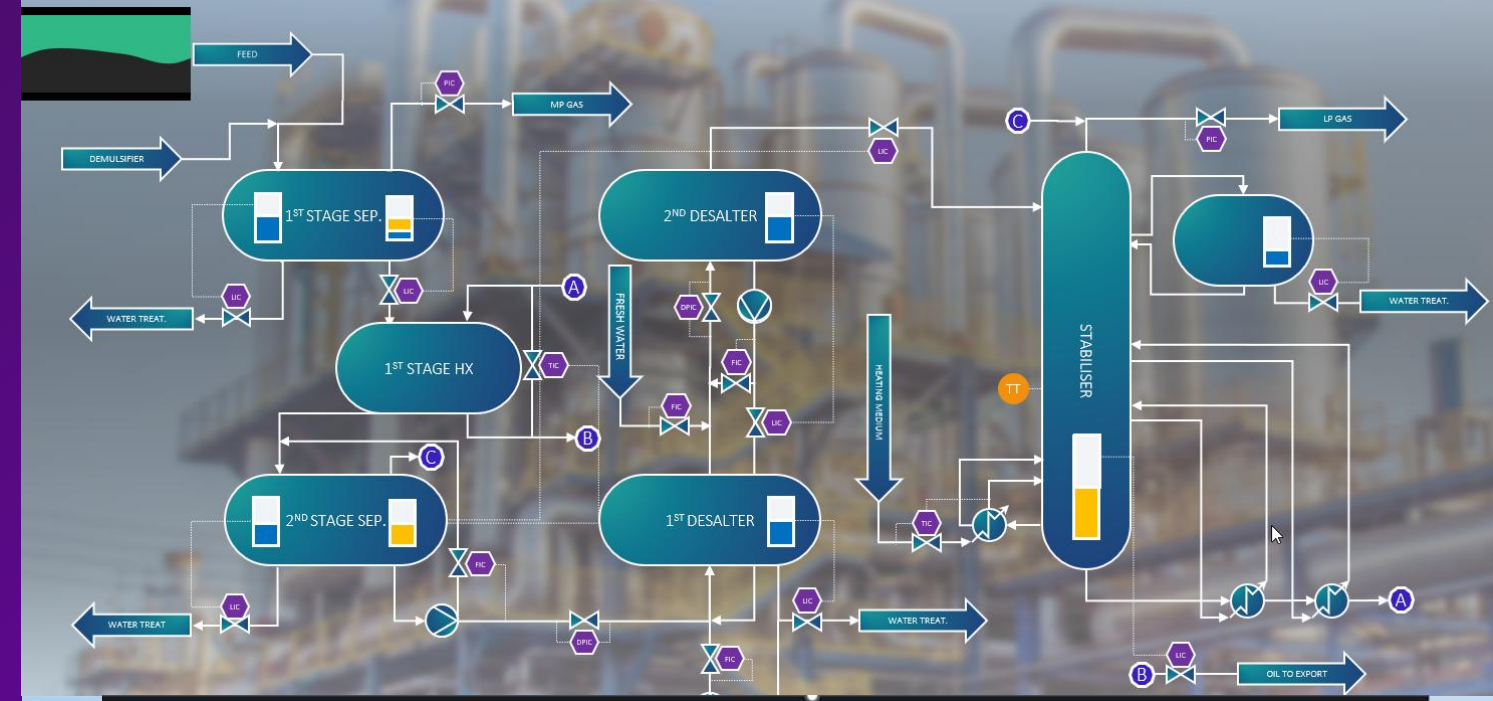
Customer case study:
Super-Major Energy Company

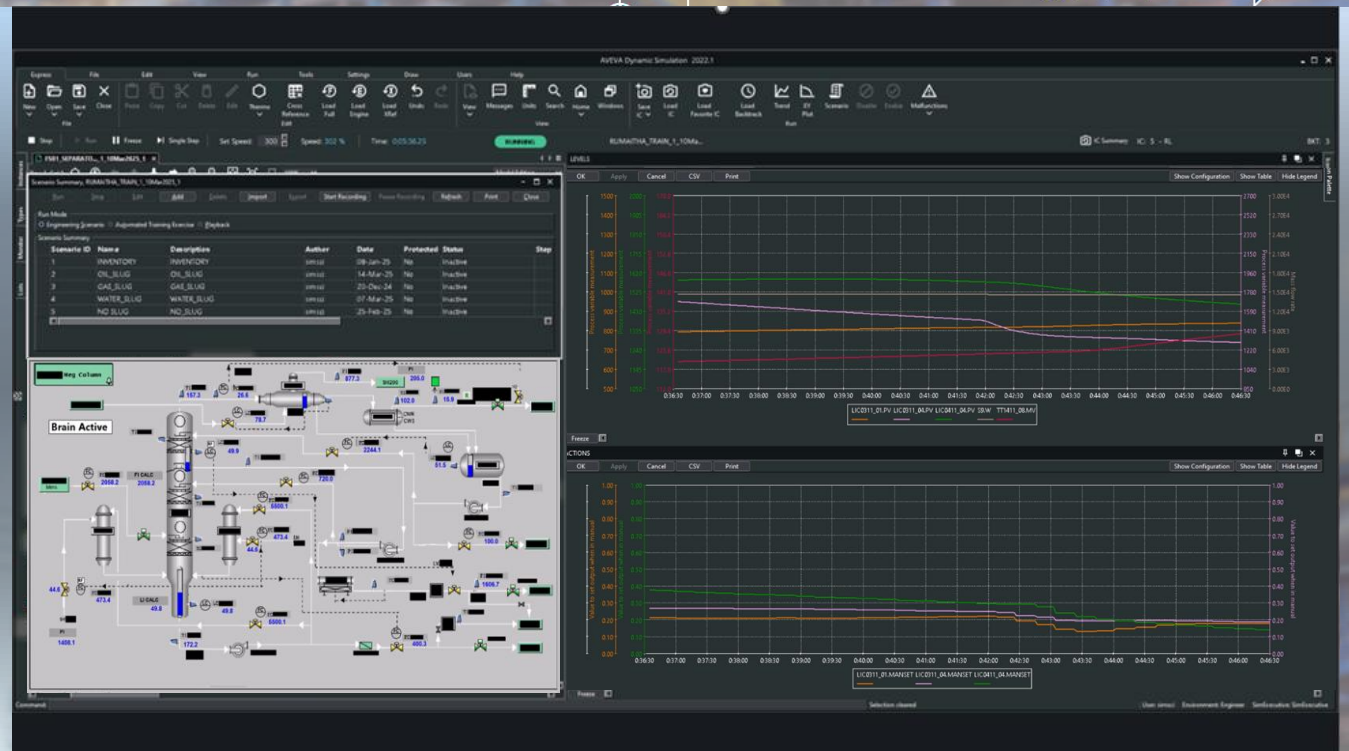
- ✓ Autonomous control of transient scenarios
- ✓ Feed disturbances due to slugs
- ✓ Eliminate operator intervention
- ✓ Maximize utilization of existing hardware
- ✓ Open or closed loop

Dynamic Simulation trains the AVEVA AI (RL) brain (offline)



The AVEVA AI (RL) brain guides the industrial process(es) (online)





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