AI Fundamentals for Industry

An introductory workshop for engineering and operations teams and other interested professionals

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Target audience

Production engineers and technical staff, maintenance and quality professionals, process optimization specialists, technical managers and team leaders who need solid AI and data literacy in modern metal and manufacturing environments

Workshop goal

To give engineers a clear understanding of AI principles, a strong data science foundation, and a concrete overview of where AI and machine learning create value in manufacturing and metallurgy.

Learning outcomes

After this workshop, participants will be able to:

- Explain core AI concepts (algorithms, models, training) in clear engineering language.
- Understand why data quality, structure and availability are critical for any AI initiative.
- Recognize typical data issues in industrial environments and know what must be fixed before modeling.
- Identify concrete AI and ML application areas in their own manufacturing or metallurgical operations

Delivery options

- **On-site format:** 1 full day (4–6 hours) at your facility or a nearby venue, with room for plant-specific discussions.
- **Online format**: 2 × 2(3)-hour live virtual sessions

Workshop structure

PART 1 AI fundamentals: principles, algorithms, models

- What AI, machine learning and deep learning actually are - without heavy math.
- Key algorithm types (supervised, unsupervised, reinforcement learning) and when they are used.
- Models in practice: from simple regression to neural networks and large language models.
- How models learn from data, and why overfitting, generalization and validation matter in production.

PART 2 Data science foundations: why data comes first

- Data quality and accessibility as the invisible foundation for any successful AI initiative.
- Industrial data landscape: sensors, time series, process historians, lab/quality data, maintenance logs.
- Data quality dimensions (completeness, accuracy, consistency, timeliness) and how they impact AI results.
- Typical data problems in plants and practical mitigation approaches.
- Basic data science workflow: from raw data to features, model training, evaluation and monitoring.
- Why “fixing the data” is often the real work – and how engineers can contribute before any model is built.

PART 3 Where AI and ML create value in manufacturing and metallurgy

- High-impact application areas: Predictive maintenance for critical equipment; Process optimization and parameter tuning; Quality inspection and defect detection (including computer vision); Energy and resource efficiency; Supply-chain and production planning support
- Examples and mini-cases from metals and related manufacturing sectors to make each area concrete.
- How to spot “AI-able” problems in your own plant using simple opportunity filters (value, data, feasibility)

Interactive elements

- AI literacy self-check: short quizzes to map current understanding and correct misconceptions at the start of the day.
- Data quality exercise: participants review example datasets and identify issues that would break a model in production.
- Use case mapping: small groups list and categorize potential AI/ML applications in their own operations.
- Personal action plan: each participant defines 2–3 concrete ideas to explore in their daily work over the next 30–90 days.