DIGITBRAIN

Experiment 5
Digital Brain for Laser-Cutting and Forming of Aluminium

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Experiment Integration
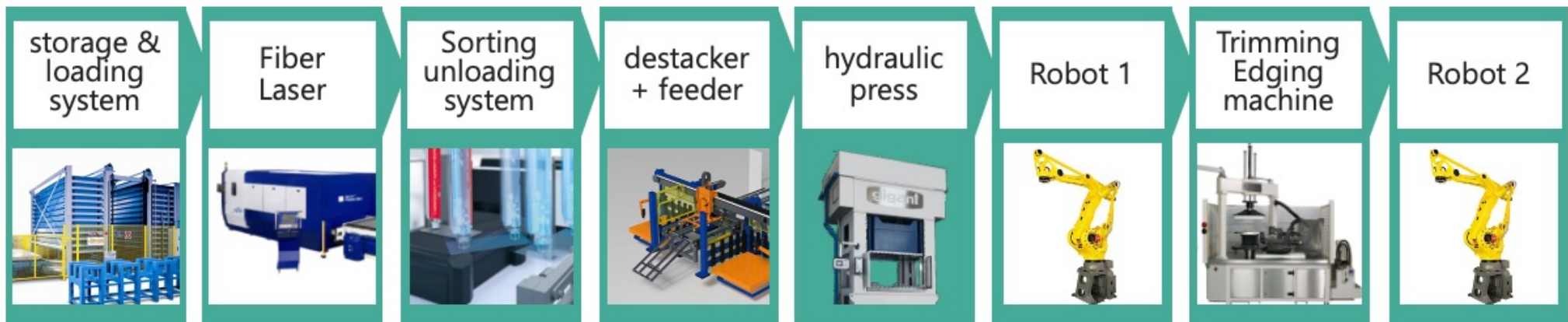
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Experiment overview

✏️ GIGANT is a manufacturing SME working in the metal processing field

| storage & loading system | Fiber Laser | Sorting unloading system | destacker + feeder | hydraulic press | Robot 1 | Trimming Edging machine | Robot 2 |

Laser-cutting and forming of aluminium products: a complex, automated manufacturing system where different technologies, different vendors and different control systems co-exist and cooperate.

| TTS - ISV | START4.0 - DIH | NXT - VAR |

Experiment overview

The "as is" situation, the end user needs:

- Need to use a digital twin in the bidding/negotiation phase
- Need to perform real-time "what-if" analysis based on the actual plant data
- Need to provide simulation services and analytics empowered by the knowledge developed all along the plant's life-cycle

To be:

- Implementation of a Digital Brain solution for one of GIGANT's manufacturing systems

Other partners

Technology Transfer System realized a modular system to create digital twins of GIGANT production lines using DDDSimulator

NXT control developed a IEC-61499 Middleware to interface the PLC's of the real plant with the DigitBrain platform
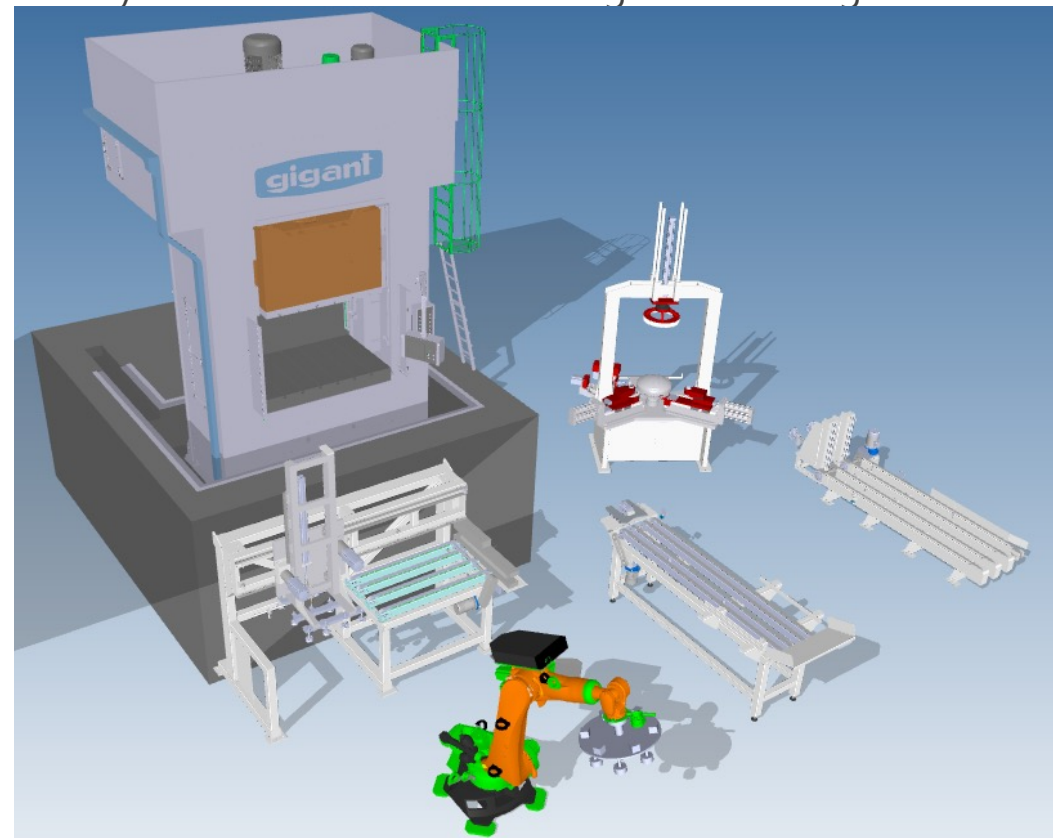
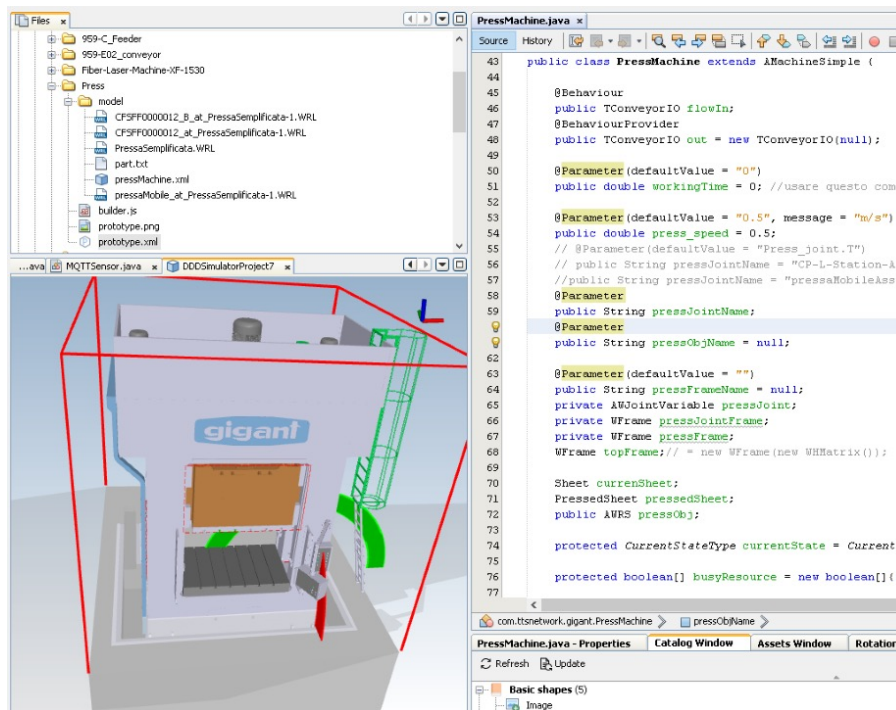START 4.0 coordinated the experiment

Experiment overview

The scope of the experiment is not to realize a single simulation model, but a **catalogue** of modular **prototypes** which can be used to compose alternative layouts of lines for the cutting and forming of aluminium sheets

Introduction to the experiment

The modules are then combined using a drag and drop interfaces and connected to create a plant layout
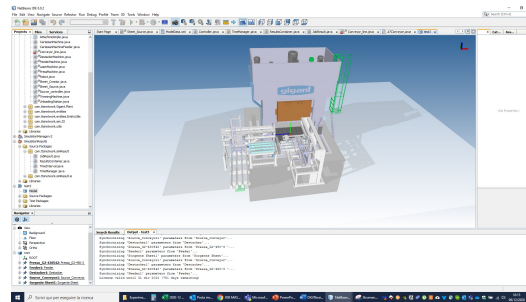
Click to see attached video

Architecture: negotiation/bidding phase
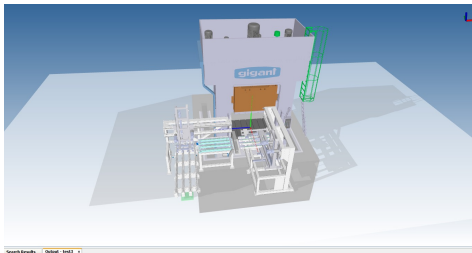
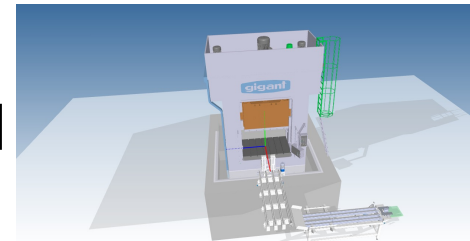## DDD Model editor

Simulation models

Layout X

Layout Y

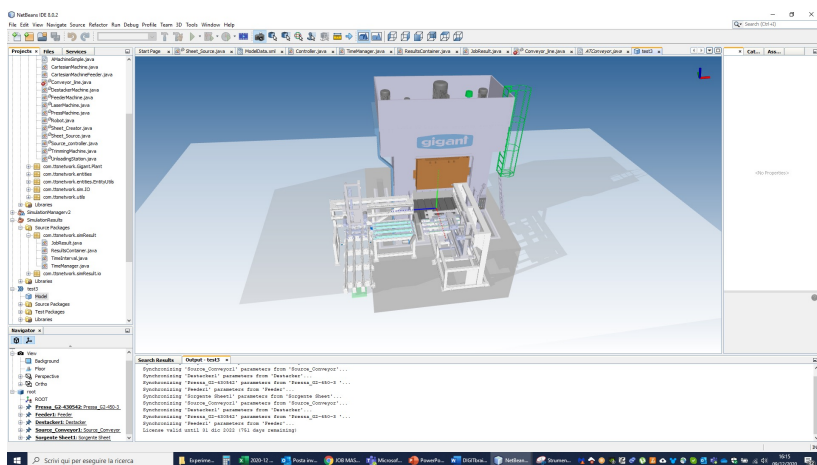Production plan Parameters

KPIs

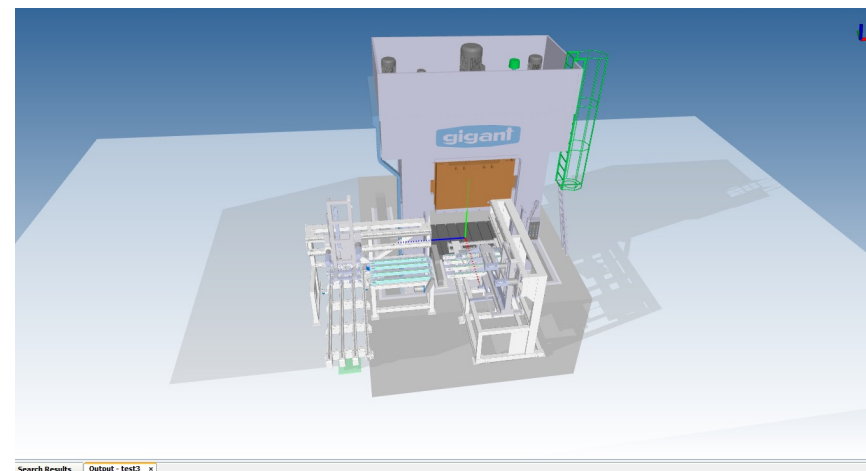Production plan Parameters

Mapping of the experiment

Authoring tool

DDD Model editor on a local PC
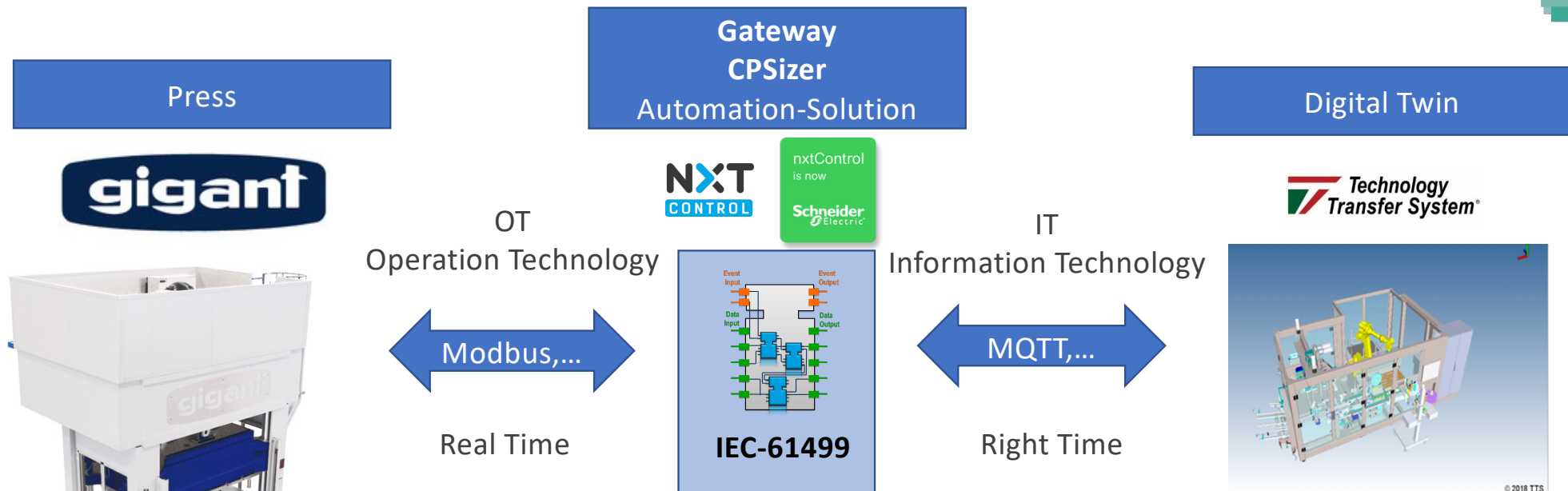
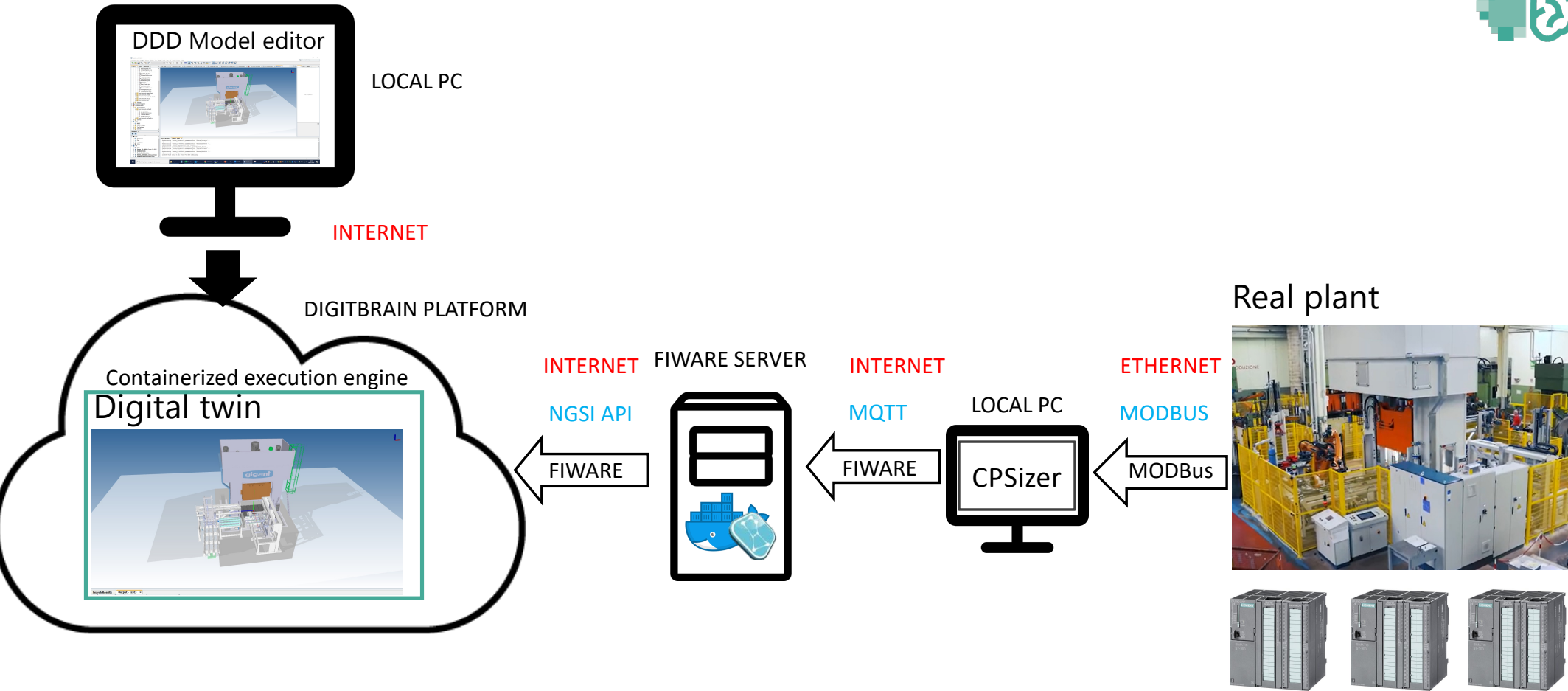## DigitBrain compatible digital-twin

Simulation bundle

EXPORT

IEC61499 – Mapping of shop floor and Simulation

Press

**Gateway
CPSizer
Automation-Solution**

Digital Twin

gigant

NXT CONTROL

nxtControl is now Schneider Electric

Technology Transfer System®

OT
Operation Technology

IT
Information Technology

Modbus,…

IEC-61499

MQTT,…

Real Time

Right Time

© 2018 TTS

- **Distributed connectivity**
- **Flexible data flow integration**
- **Object Orientation**
- **Event-Driven**
- CPSizer: upgrade of existing PLC with IEC 61131
- Data Analysis (AI, Predictive Maintenance-integration)
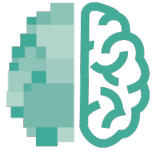- Independent from the hardware

Architecture: first deployment

DDD Model editor

LOCAL PC

INTERNET

DIGITBRAIN PLATFORM

Containerized execution engine

Digital twin

Real plant

INTERNET   FIWARE SERVER   INTERNET   ETHERNET

NGSI API   MQTT   LOCAL PC   MODBUS

FIWARE   FIWARE   CPSizer   MODBus

Advantages of platform integration

- Standardized deployment infrastructure

- Possibility of integration with other simulation models

- Distributed architecture

- Computational power on-demand

- Easily deployable infrastructure for the connection with the factory data

- Distributed shop floor

- Standardization of knowledge all along the plant's life-cycle

THANK YOU
for your interest

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