

BrAIN

Brownfield Artificial Intelligence Network for Forging of High Quality Aerospace Components

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Brief description of the consortium partners

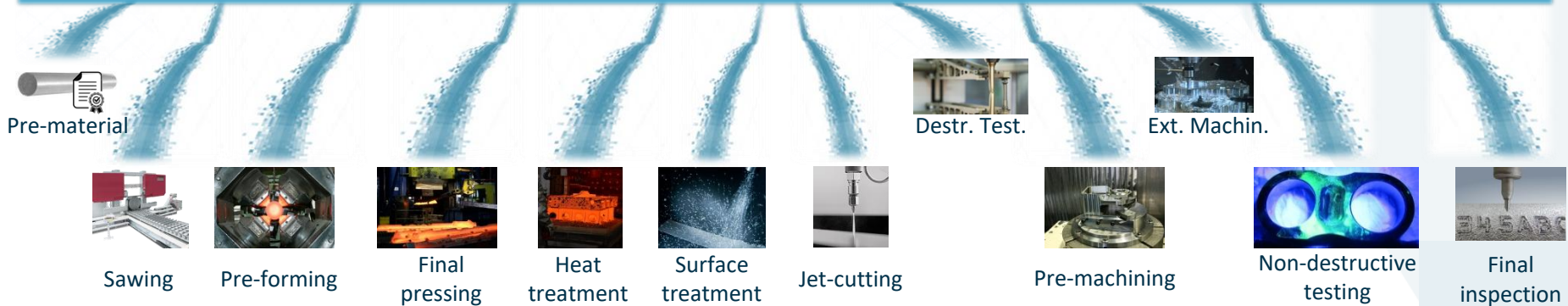
- voestalpine BÖHLER Aerospace GmbH & Co. KG
- Know Center Research GmbH
- Evon GmbH
- JKU: LIT Cyber-Physical Systems Lab

Aim of the project / Background of the project

- Self-learning optimization model towards an ideal forging process

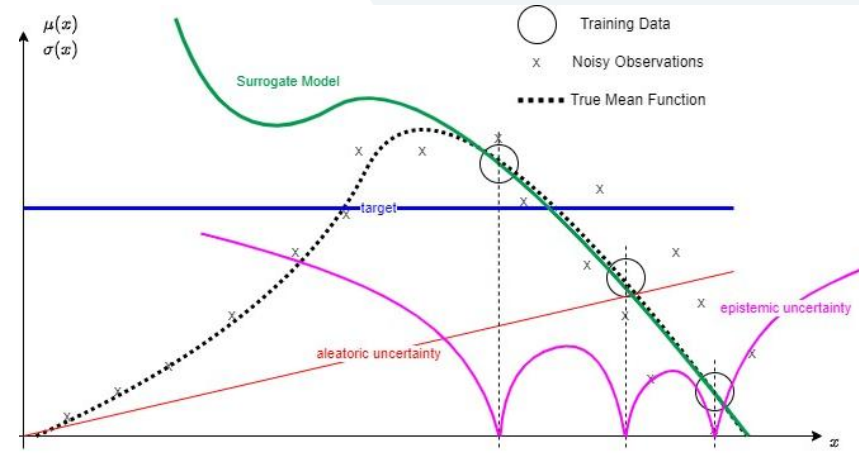
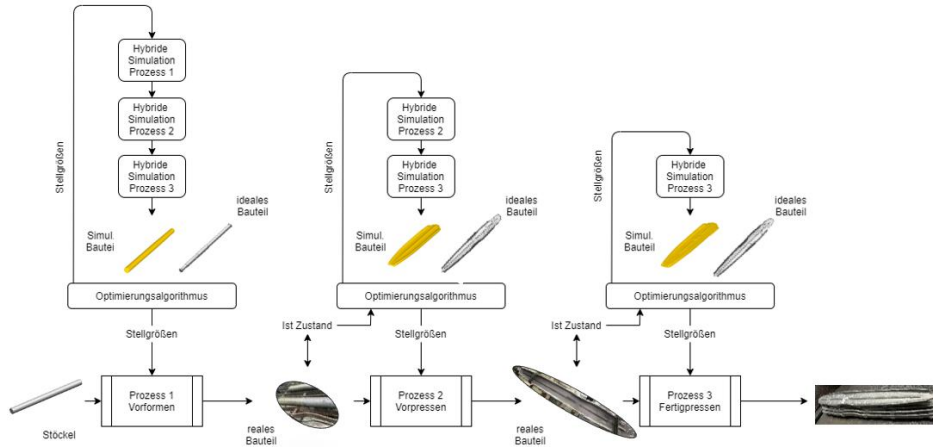


Data platform



Project results

- AI-model: Bayesian algorithm



Project results

- AI-model: Bayesian algorithm
- x-AI model: Mock-up with event-based model application

(X)AI-Supported Process Optimization Tool

Process Chain 56554
Process Step 0500
Batch Number 1234661
Filter Unprocessed

Material Measurements

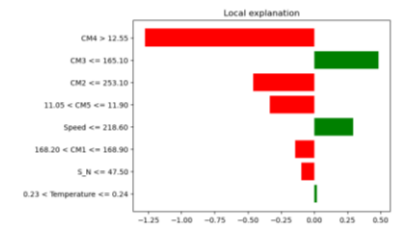
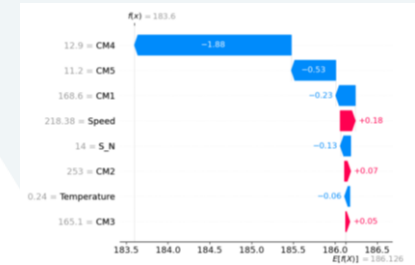
Name	Value (Ø max min)
CM1	168.16 / 169.60 / 166.90
CM2	254.36 / 256.80 / 251.70
CM3	165.29 / 165.50 / 165.10
CM4	11.85 / 13.90 / 10.20
CM5	12.52 / 14.00 / 10.40

Parameter

Name	Default	AI-Suggested	Custom
Temperature	0.25	0.25	0.25
Speed	219	219.22	219

AI-Predicted Output

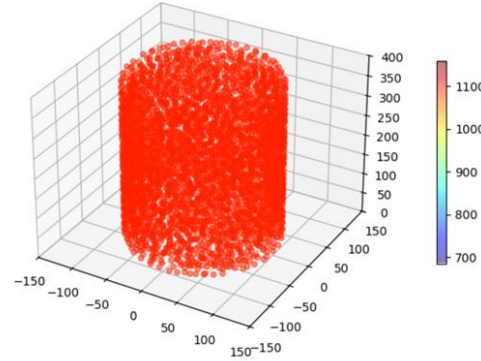
Name	Target	Default	AI-Suggested	Custom
CM6	185	185.9 / 183.9	186.7 / 183.9	185.9 / 183.9



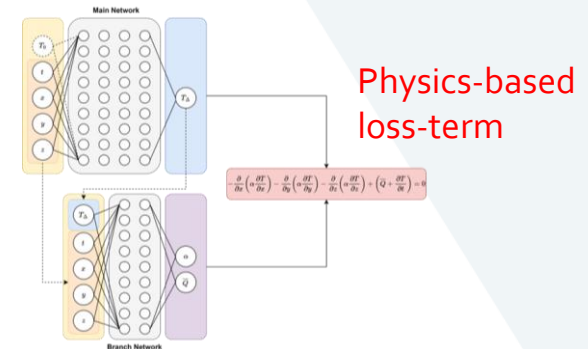
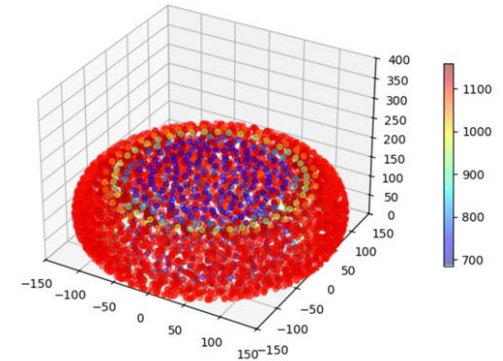
Project results

- AI-model: Bayesian algorithm
- x-AI model: Mock-up with event-based model application
- Incorporation of FEM models for model training & FEM surrogate modelling

Simulationsstart

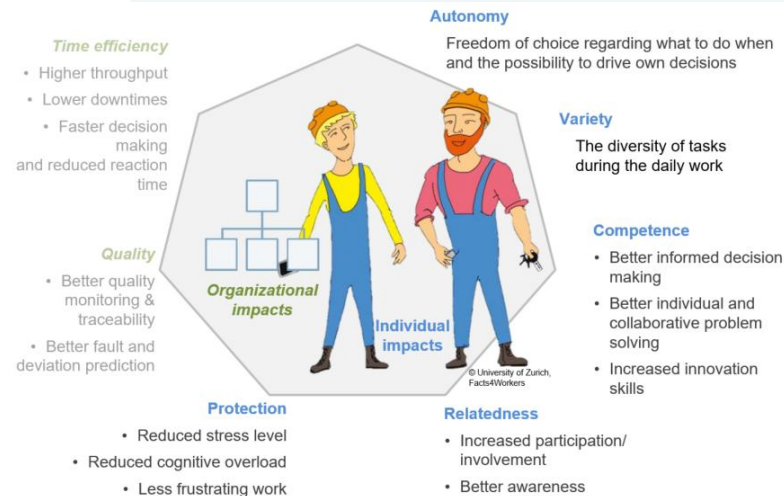


Simulationsende



Project results

- AI-model: Bayesian algorithm
- x-AI model: Mock-up with event-based model application
- Incorporation of FEM models for model training & FEM surrogate modelling
- Employee feedback on AI-interaction
- Identifying the data demand for self-learning optimization



Utilization of the project

- Scientific:
 - 2 PhD's
 - 13 publications
 - Different models for industrial application
- Industrial:
 - SCADA architecture for brownfield environment
 - Certain model blocks for specific applications (e.g. BrAIN impact detector,...)
 - Data gaps towards self-learning optimization

Further steps/(potential) follow-up projects

- Initiated projects at voestalpine BÖHLER Aerospace:
 - Virgital: virtual & digital twins (FFG Basisprogramm, 2021)
 - FoRCAS: Robust & Accurate Simulation Tools (FFG Basisprogramm, 2025)
 - Several internal initiatives
- Potentials:
 - Accelerating (or partially substituting) FEM simulation with physically inspired surrogate models