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PRESENTER FULL NAME: Kersten Marx

ORGANIZATION: VDEh-Betriebsforschungsinstitut GmbH

WORKSHOP NAME: Workshop#2-Twin Green and Digital Transition of Industry

E-MAIL: kersten.marx@bfi.de



Description of the Organisation
VDEh-Betriebsforschungsinstitut
GmbH (BFI), Düsseldorf, Germany



Private, non-profit institute with a focus on applied research and development

Innovation as well as short- and medium-term R&D driven by the demands of the industry

Key areas are **plant, process and holistic systems**, no material science
Large national and international **network** (with research and industry partners)

Bilateral research, funded research, services, industrial projects, licensing of patents
Approx. **100 employees**, 70% of whom are academics and post-docs

Your Teams' Expertise

We concentrate on “process optimization”, closely applied to industry, with core area steel industry. This includes process and plant oriented **digital and technical measures**.

The objectives of the work are optimization of **product quality** and **productivity**, increase of **plant availability**, reduction of **production costs and emissions** as well as development / implementation of **new processes**.



Kersten Marx
Research Manager
Dpt. Process Optimisation Iron
and Steel Making
Phone: +49 211 98492 -384
E-mail: kersten.marx@bfi.de



Tolga Eroglu
Researcher
Dpt. Process Optimisation Iron
and Steel Making
Phone: +49 211 98492 -619
E-mail: tolga.eroglu@bfi.de

Your Research Fields



CO₂-Reduction and Energy Efficiency



Digitisation and Process Measurement



Circular Economy

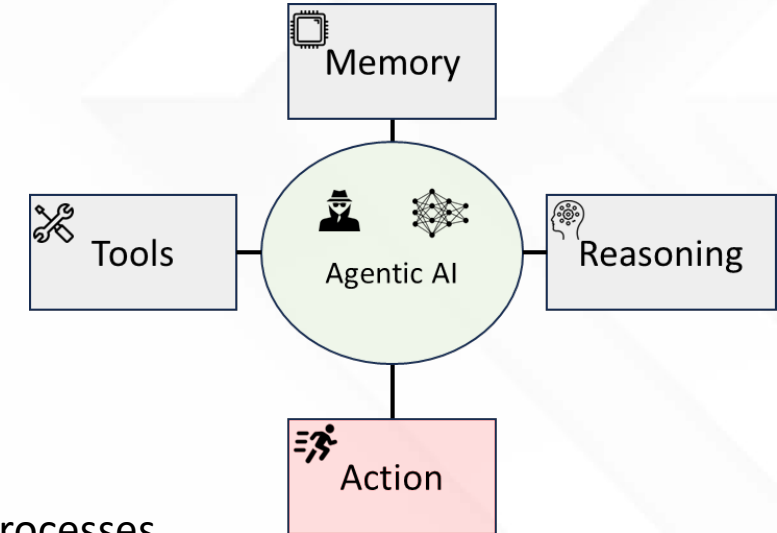


Process Optimisation

Your On-going Projects

MaxH2DR	Maximise H ₂ Enrichment in <u>Direct Reduction</u> Shaft Furnaces
TransZeroWaste	Upgrading of <u>low-quality iron ores and mill scale</u> with low carbon technologies
GreenHeatEAF	Gradual integration of renewable non-fossil energy sources and modular heating technologies in <u>EAF</u> for progressive CO ₂ decrease
ProcTwin	Integrated modelling for sustainable and optimized <u>steel manufacturing</u> processes
H2TransBF2030	Minimisation of CO ₂ Emissions from the <u>BF by hydrogen containing injectants</u> during transition to new Ironmaking processes until 2030
AgiFlex	<u>Agent-based models</u> minimizing carbon usage in flexible and efficient future integrated steelworks
AMIGDALA	Alliance for <u>Modelling Industries</u> towards the Green Deal's objectives And circularity
H2II	Hydrogen sequence <u>impulse injection</u> into the <u>Blast Furnace</u> shaft
METACAST	Mapping, Educating, Training, Applying models in <u>continuous CASTing</u>
SUNSHINE	Sustainable new <u>casting and rolling process</u>
AND 47 OTHERS ...	

Project Idea: Redefining industrial decision-making processes through the use of agent-based AI
AgenticAI



Call Topic: CL4-2025-01-TT-32: Green and resilient flexible production processes

Deadline Dates: September 2025

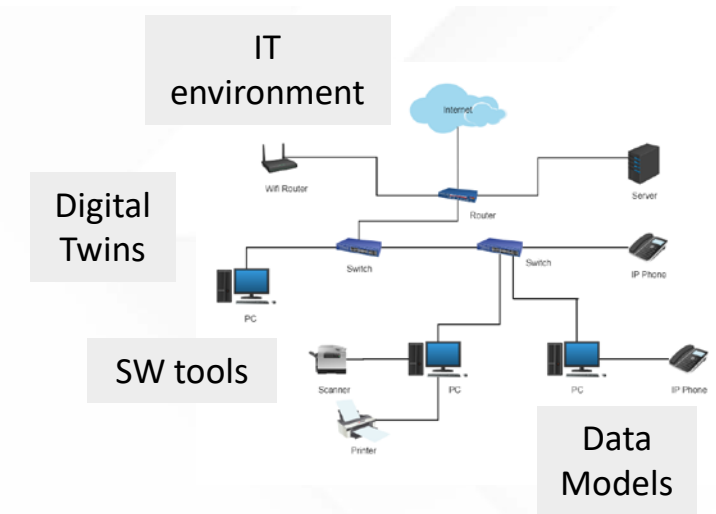
❑ **Objectives:**

- Combining continuous monitoring of production processes with complex reasoning and rapid decision-making to enable more efficient industrial decision-making processes.
- Providing personalized information and supporting interactive discussions of production problems to improve effective industrial problem solving.
- Implement flexible adaptation to dynamic situations in the complex environment of steel production.
- Development of autonomous AI agents that complement rather than replace human capabilities.

❑ **Expected Results:**

- Improve operational efficiency and reduce costs by processing large datasets and real time decisions.
- Improving problem solving by machine learning capabilities with goal-oriented behavior.
- Improving the transparency and explainability of the results through enhanced AI functionality.

Project Idea: De-risking the transformation process towards carbon neutral steel production by integrating the DR-EAF route with various input materials



Call Topic: EU-Call HORIZON-CL4-INDUSTRY-2025-01-TWIN-TRANSITION-37: Solving issues in carbon-neutral iron and steel making processes with diverse input materials of varying quality

Deadline Dates: September 2025

☐ **Objectives:**

The aim of the project is to de-risk fundamental issues of the transformation process towards carbon-neutral iron and steel production with a system-level approach considering the whole production chain.

☐ **Expected Results:**

- Direkt reduction and EAF: new know-how of physical&chemical processes, digitalisation & enhanced models, new measurement and control tools
- Prevention of process issues and product quality losses using low quality materials and residuals
- Recycling and processing concepts of residuals & low-quality materials in DR-EAF and mixed routes with BF-BOF
- Risk and Life cycle analysis of DR-EAF and mixed routes with BF-BOF
- Holistic optimisation of process integration and energy supply & management including H₂ and derivatives



Project Idea: Operating the net-zero blast furnace

Call Topic: EU-Call HORIZON-CL4-INDUSTRY-2025-01-TWIN-TRANSITION-37 / RFCS 2025

Deadline Dates: September 2025

☐ **Objectives:**

The project shall examine new BF operation set points if operated with increasing CO₂ mitigation, e.g.:

- demonstration of technology (shaft gas injection, H₂ + derivatives, top gas treatment, CCUS, ...)
- material behaviour under new process conditions (e.g. new standards) and most efficient work-points
- new digital tools for e.g. process monitoring&optimization, decision support, predictive maintenance
- sustainable strategies to combine measures for stepwise CO₂ mitigation towards zero

☐ **Expected Results:**

- technology assessment, TRL enhancement and improved profitability of CO₂ mitigation technologies
- No-code platform “InduStream” for IIoT use cases (Industrial Internet of Things)
- new digital tools for planning, process analysis, monitoring and control
- decarbonization roadmap for sustainable BF-based steel production, also in combination with DR-EAF

Consortium - profile of known partners (if any)

No	Partner Name	Type	Country	Role in the Project
01	DSD Automation GmbH	SME	Germany	automation
02	Hüttenwerke Krupp Mannesmann GmbH	Ind.	Germany	steel producer and BF operator
03	RINA Consulting Centro Sviluppo Materiali	Res.	Italy	modelling
04	Industream Sàrl	SME	Luxembourg	AIoT platform
05				

Consortium – required partners

No	Expertise	Type	Country	Role in the project
01	primary steel production	Ind	Turkey	steel producer and BF operator
02				
03				
04				



PRESENTER CONTACT
DETAILS:

Kersten Marx

kersten.marx@bfi.de

VDEh-Betriebsforschungsinstitut

Sohnstrasse 69

40489 Düsseldorf

COUNTRY:

Germany