

CONTROL^{IN}STEEL

Deliverable 1.2: Abstracts for publication in journals, conferences and workshops

Version: 2022-02-02

Updated: 2022-02-20

Former Deliverable D3



1. Project summary

The project ControlInSteel is a dissemination activity. Focus of the dissemination are advanced control and automation concepts in the downstream process chain of the European steel production.

Today, knowledge engineering is a mature tool for analyzing problem solutions paths chosen by research projects as functions of impact, effort and problems. In ControlInSteel, controlled vocabularies will be developed, extended to taxonomies and ontologies to describe the interplay between chosen method, targeted problem and impact. Outcome of the project will be a systematic analysis which methods have been the most effective ones for reaching the desired impact.

At the center of any dissemination project is the distribution of results. On the one hand by discussing the results found by the ControlInSteel evaluation. On the other hand, by broadening the knowledge about those former project results that are evaluated by the project.

ControlInSteel started within the global COVID-19 crisis. The projects initial plan to conduct face-to-face workshops for the dissemination was slightly changed towards digital workshops and on-demand course material. The project team believes, that with this approach, the dissemination work will be even more reusable for the future.

2. Dissemination events

2.1. Already conducted dissemination work

There are different types of impact that are produced during a project. A predominant part of the work in ControlInSteel is the dissemination as such. We use our information gained about the former projects to explicitly address topical areas in specific talks. In the following table we compiled activities, talks and papers that were already published in the context of ControlInSteel:

| Activity | Date | Who | Title | Comment |
|---|------------|-----|---|--|
| Future Steel Forum (FSF2020) | 08.12.2020 | BFI | Explainable and Physics-Informed Machine Learning for Optimizing Process Chains and Product Quality | Used preliminary assessment of project in ControlInSteel to motivate the usage of AI in automation systems, produced an online webinar |
| Group Meeting of the Focus Group SmartFactories | 11.12.2020 | BFI | Presentation on digital techniques for the inclusion of expert knowhow gathered from | Discussion with the members of the focus group; |

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| | | | previous research projects into the online, real-time automation systems of daily production | |
| World Steel Association | 18.02.2021 | BFI | Internal discussion with experts on automation systems, extraction of expert knowledge and the | Ca. 5 experts from the research audience |
| BFI Colloquium | 05.05.2021 | BFI | Demonstration of project to target audience German Steel Producers | Online, audience ca. 100 |
| iba Tab, Conference of users of the target audience: automation system builders | 07.05.2021 | BFI | From passive information to reactive automation and control systems that utilize explainable AI | Est. 90 viewers with strong control and automation backgrounds as well, as maintenance experts |
| 5 th European Steel Technology and Application Days | 15.06.2021 | BFI | The ControlInSteel Project: Systematic Analysis of Advanced Automation and Control Solutions in EU Funded Research Projects of the Last Decades | Dedicated introduction to the project, including result demonstration, derivation of the taxonomies and online discussion with peer group. A video of the talk was recorded and distributed among the audience |
| 5 th European Steel Technology and Application Days | 15.06.2021 | BFI | From machine learning towards autonomous, explainable artificial intelligence in industrial automation for steel processing | Video was recorded and distributed among the audience |
| RWTH Aachen | 16.12.2021 | BFI | Advanced modelling, uncertainty and learning to improve control systems for modern production facilities (Lecture) | Ca. 30 students of engineering science |

2.2. Planned dissemination activities

The partners pursue normal publication activities and therefore regularly publish at certain conferences. ControlInSteel will be included in the following upcoming conferences:

| Activity | Date | Who | Title | Comment |
|--|------------|-----|---|-------------------|
| 14 th Intelligent Manufacturing Systems | 29.03.2022 | BFI | Detection of malicious states in automation systems for engines | Presumably online |
| BFI Colloquium | 22.05.2022 | BFI | (in German) | |
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3. Webinars planned by the project team

Based upon the assessment of the projects and oriented towards the overall European research agenda for RFCS, the CleanSteel Partnership (CSP) and the HorizonEurope programme – especially the Planets4Processes PPP, the project team defined the following topics to be of crucial importance:

1. Advanced control solutions for sustainability

This topic addresses the application of modern control methodology to environmentally and economically important use cases. Such use cases were covered by a part of the reviewed projects. Given the analysis of the impact distribution, the topic of sustainability is fully aligned with the ideas of the European Green Deal and we see a lot of project results with potential for reuse or modified use in these application domains.

Envisioned is a 2 hour long, recorded webinar consisting of 10min introduction, 20 minutes of presenting ControlInSteel results concerning the dedicated use case area and then 4 individual 20 minute contributions by various speakers, followed by discussion of the topics.

This webinar is scheduled for 26.05.2022, 14:00.

2. Distributed, autonomous control solutions

This topic addresses mathematical and computational strategies to apply control approaches in a distributed way. Consensus methods, autonomous systems, adversarial techniques, and their integration into existing MPC and ILC setups will be discussed.

The webinar will also be 2 hours long. It will be recorded and start with a 10min introduction followed by an invited talk of 30 minutes. Then 4 individual speakers present 20-minute contributions, followed by discussion of the topics.

This webinar is scheduled for 01.06.2022, 14:00

3. "AI in Control?" – perspectives of new automation paradigms

A visionary webinar collecting the most innovative control solutions from the past projects, which applied already AI techniques to advance the control results. This is introduced by short summary of control concepts that benefit from machine learning and from expert knowledge. Then it is followed by talks on application examples, where each talk features a 20-minute slot.

This webinar is planned for 23.06.2022, 14:00.