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Künstliche Intelligenz in der Produktion von Werkstoffen (Artificial Intelligence in the Production of Materials)

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Summary

Some 230 persons from the entire steel industry (mainly Austrians) took part in the workshop "Künstliche Intelligenz in der Produktion von Werkstoffen - *Artificial Intelligence in the Production of Materials*". More than 70 individuals from the Austrian steel industry and industry related organisations have shown interest to become members of the ASMET Digitalisation committee (equivalent to Jernkontoret's TO 60). All in all, eleven presentations were made during the one-day event.

The most important conclusions that can be drawn are that AI will be useful for a lot of processes going on in the steel industry, e.g. production monitoring as well as for laboratory work. A deep team work between process experts, data analysts and data infrastructure builders is essential for making AI projects successful.

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1 Introduction

230 delegates from – mainly – Austria gathered 9 May 2019 in the Montanuniversität Leoben for the annual ASMET Forum für Metallurgie und Werkstofftechnik. The topic for the 2019 workshop was Künstliche Intelligenz in der Produktion von Werkstoffen - *Artificial Intelligence in the Production of Materials*. The delegates represented a broad part of the (Austrian) steel industry, IT specialists, process developers, suppliers, universities and institutes as well as other related functions.

The workshop was followed by the 1st meeting of ASMET Arbeitskreis, “Digitalisierung” - *ASMET Committee No. 9 “Digitalisation”*.

All in all, eleven presentations - nine during the workshop and two during the committee meeting - were made on Artificial intelligence (AI) related topics.

2 Artificial Intelligence in the Production of Materials

All in all, nine presentations were given at the workshop "Artificial Intelligence in the Production of Materials". The entire list of presentations can be found in Appendix 1. At the workshop, only a few presentations contained results from projects where AI had been used. Below some results and conclusions are presented.

Monitoring and process control are two areas AI is particularly suited for.

Some examples of fields where AI could be of use were given by voestalpine; Image analysis, Customer interaction, Planning and optimization, Big data analysis, Process modelling as well as Education.

Another important notice by voestalpine was that Data Science and AI need three types of expertise with common contribution in order become successful, Process expertise, Data analysis and Data infrastructure, see figure 1.

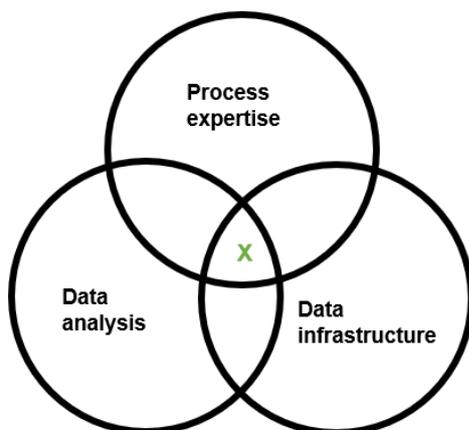


Figure 1. Required fields of expertise for development projects built on AI. "X" denotes the desired combination of competences for a successful AI project group.

APO/Refractory 4.0 – Automated Process Optimization. RHI Magnesita built a digital wear model for refractory components in metallurgical vessels. Based on knowledge about wear mechanisms, brick types etc. combined with influencing parameters – No. of heats, steel grade, temperature etc. - it is possible to predict the remaining lining life. Lower refractory consumption and downtimes for repair are some of the outcomes from using AI.

3 ASMET Committee “Digitalisation”

ASMET, the Austrian Society for Metallurgy and Materials, has got several technical committees for different steel technologies, much like Jernkontoret’s research organisation with Technical areas and Councils. A new committee - on digitalisation - is currently in a start-up phase. After the workshop on AI, the 1st meeting of this committee was held.

More than 70 individuals from the Austrian steel industry and industry related organisations have shown interest to become members of the Digitalisation committee (equivalent to Jernkontoret's TO 60).

Committee meetings are planned to be held twice a year. At the meetings, members will make presentations of case studies made within their own organisations

4 Impressions and Reflections

Some impressions from the workshop and ASMET committee meeting are listed below:

- Voestalpine seems to be successful in their AI development work.
- AI engages a lot of interest in Austria. 230 took part in the workshop and 70 individuals have shown interest to become members of ASMET's "TO 60".
- There seems to be a slight gender imbalance when it comes to AI. Only a few women were present at the workshop and the committee meeting.
- People of all ages were represented – not only young data scientists but also experienced steel plant engineers.
- AI is applicable all over the process chains in steel industry (monitoring, image analysis (segregations, strip surfaces), mechanical wear, refractory wear...
- A deep team work between process experts, data analysts and data infrastructure builders is essential for making AI projects successful.

5 Conclusions and Recommendations

Some conclusions and recommendations made from the observations made at the workshop on AI as well as from the meeting with the ASMET Committee "Digitalization" are shown below.

- There is a huge interest in AI within the Austrian steel industry. 70 individuals have shown interest to join the ASMET Committee "Digitalisation".
- The Swedish steel industry seems to have fallen behind when it comes to implementation of AI in the daily practice, at least in comparison to Austria.
- AI can be used in various cases over the steel industry. The examples from voestalpine and RHI Magnesita show that clearly. Only the cooperation between representatives from the three work categories: process expertise, data analysis and data infrastructure will lead to successful AI projects.
- The work within TO 60 should be organized to include more people from the industry's production facilities, with small seminars and presentations of case studies to increase the interest in AI for production lines in the steel industry. A deep team work between process experts, data analysts and data infrastructure builders is essential for making AI projects successful.
- TO 60 should set up project applications to make AI a useable tool in the steel work's activities.

Appendix 1

Presentations made at the workshop as well as at the ASMET committee "Digitalisation" meeting:

Workshop

- Matthias Böhm, Technische Universität Graz: Datengetriebene Künstliche Intelligenz in der Produktion
- Roland Sommer, Plattform Industrie 4.0: Chancen und Potenziale für künstliche Intelligenz
- Stefan Schuster voestalpine Stahl Linz, Johann Reisinger, R&D Mechatronics:
Einsatzmöglichkeiten von künstlicher Intelligenz im industriellen Umfeld - voestalpine Steel Division
- Franz Rotter, Michael Eder, Adrian Salmon voestalpine High Performance Metals Division: Künstliche Intelligenz als Treibstoff der Digitalen Transformation - voestalpine High Performance Metals Division
- Gregor Lammer, RHI Magnesita: Refractory 4.0
- Katja Windt SMS group: The Learning [Steel]Plant - turning data into value
- Manfred Kügel Primetals Technologies Austria GmbH: Chancen und Potenziale der künstlichen Intelligenz in der Metallindustrie
- Robert Pierer qoncept dx GmbH: Dolly und die intelligente Stahlproduktion

ASMET Committee Meeting

- Gerhard Svolba, SAS Institute Software GmbH: 5 Qualitätsparameter einer erfolgreichen Artificial Intelligence Plattform
- Bernhard Zimmermann, Zühlke GmbH: Künstliche Intelligenz in der Praxis: zwischen Buzzword, Tech-Revolution und wirtschaftlichem Mehrwert
- Heinz Mayer Institut Digital, Joanneum Research: Künstliche Intelligenz oder die Evolution vom leistungsfähigen Sensor zum intelligenten Messinstrument

Radera ej denna rad

The Swedish Steel Producers' Association

Since its foundation back in 1747, Jernkontoret has been owned jointly by the Swedish steel companies. Jernkontoret represents Sweden's steel industry on issues that relate to trade policy, research and education, standardisation, energy and the environment as well as transport issues. Jernkontoret also manages the joint Nordic research in the steel industry. In addition, Jernkontoret draws up statistical information relating to the industry and carries on research into the history of mining and metallurgy.