AMC NU

ADVANCED MANUFACTURING PROGRAM (AMP)

Powered by: Regio Deal Twente

During the AMC opening week, three industry workshops were conducted, each delving into a distinct area of advanced manufacturing:

- Digitalisation,
- Manufacturing Systems,
- and Manufacturing Processes.

In the Digitalisation workshop, a comprehensive discussion unfolded around various industrial information management systems, emphasizing the critical role they play in overseeing the entire digital infrastructure. Additionally, the workshop presented five key takeaways from working with artificial intelligence, shedding light on its transformative potential.

The Manufacturing Systems workshop showcased diverse real-world examples of flexible and integrated manufacturing setups that can efficiently produce a high volume of highly customisable products.

Lastly, the Manufacturing Processes workshop explored a wide array of techniques for analysing and optimizing CNC processes. Furthermore, it offered invaluable insights for designing within the realm of Additive Manufacturing.

FIP-AM@UT's extensive in-house experience in these areas positions it as a valuable partner for companies aiming to ascend to the next level of Advanced Manufacturing.

Contact us today to explore potential projects and workshops that could drive your organisation's success within the advanced manufacturing landscape.

The Advanced Manufacturing Program (AMP) is a grant program that helps us businesses support your transformation to Industry 4.0. This is made possible by the RegioDeal, supported by the Province of Overijssel and the Dutch State.

Rijksoverheid

provincie **Overijssel**

regio Twente

Twente

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Digitalisation Workshop

25 Industry Attendees

2 Keynote Speakers

6 Field Experts

Keynote Speakers

"Digitalisation Vision and Lessons Learned"

vanraam — Let's all cycle

Manufacturer specialised in the production of special needs bicycles for people that cannot cycle on a traditional bicycle with two wheels.

CHALLENGE

Lots of data from production and products **+** Unmanageable product structures

Digitalisation Goal

Reliable + **Stable** + **Flexible** + **Scalable**

P R O D U C T I O N

OUTCOME

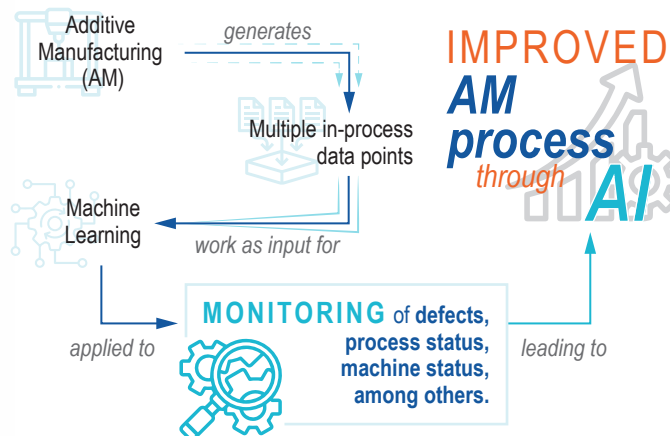Digital structure to connect and link all software and data sources.

VRIS

Get control of YOUR DATA, it is the *l u b r i c a n t* for **business processes & decisions**

"Using Artificial Intelligence in Additive Manufacturing"

SIEMENS

Technology company focused on industry, infrastructure, transport, and healthcare.

Additive Manufacturing (AM)   *generates*

Multiple in-process data points

Machine Learning

work as input for

applied to

MONITORING of **defects, process status, machine status, among others.**

leading to

IMPROVED *AM process through* AI

A R T I F I C I A L INTELLIGENCE allows to **predict** performance of **3D–printed components** such as *point of failure* & *number of cycles*

Key Topics

- 5G in Production
- Systems for Industry 4.0
- Artificial Intelligence
- Digital Twinning
- Dashboarding Solutions

Digitalisation Opportunities

How to benefit from digitalisation in production?
Industry 4.0 Audit

What are the potentials of 5G in the factory of the future?
Connectivity Solutions

How do I bring the concept of the digital twin to life?
Digital Twinning

How do I maintain an overview of the software system landscape?
Digital Infrastructure

What AI use cases are promising in my production environment?
Data Analytics

How do I design suitable dashboards that suport decision making?
Dashboarding Solutions

Manufacturing Systems Workshop

30 Industry Attendees | **1** Keynote Speaker | **3** Industry Perspectives | **6** Field Experts

Keynote Speaker

"The future of Flexible Manufacturing"

Prof. Sebastian Thiede
Chair of Manufacturing Systems
University of Twente

EVOLUTION OF MANUFACTURING PARADIGMS

CRAFT PRODUCTION
Specific orders
High variety
Relative high costs

MASS PRODUCTION
Large scale manuf.
Limited variety
Improved speed

LEAN MANUFACTURING
Minimise waste along value added chain + maximise customer value

MASS CUSTOMISATION
Customer demand for product variety
Highly complex systems

Best Practice Manufacturer
perspective from **247TailorSteel**

FOCUS: FLEXIBLE PRODUCTION

24/7 online custom order request

CUT-TO-SIZE
metal sheets and tubes
+
different materials
different thickness

manufacturing thousands of articles per day

NO STOCK, NO CATALOGUE

possible through **SEAMLESS DIGITALISATION INTEGRATION**

High Tech Systems Manufacturer
perspective from **NTS Norma**

ULTRA PRECISE manufacturing & assemblies

High degree of accuracy and customisation to meet customer requirements

Multiple machines with varying production specifications [inc. clean room environments]

NEED FOR INTEGRATION

Improve traceability | Reduce routing complexity | Balanced Lean line development

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Solution Provider
perspective from **DEMCON**

smart machine base

Start small → TEST → SCALE

FLEXIBLE CONFIGURATION

add/change/switch setup of modules

FOR SCALEABILITY

modular design | easy configuration | -1 | custom production system

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Discussion Topics

What do we do well in the Smart Industry?

*Education on data analytics
Budget allocation
Local networks
Knowledge for optimisation
High-speed data extraction*

Acknowledge your weaknesses:

Interaction among systems is still challenging

What emerging trend can we take the advantage of?

*AI applications
Language models
Automation - high mix, high volume
Planning and logistics
Data/cloud driven services*

Recognize your threats:

*Sustainability
Overwhelming change
Quick build up*

Smart Industry Challenges

Flexible Manufacturing
Flexibility-efficiency balance

Smart Manufacturing Execution Systems
New systems, new knowledge

Industry Robots
Unlock full potential of robots while addressing safety

Data from Productions Systems
Alignment between types of data and data formats
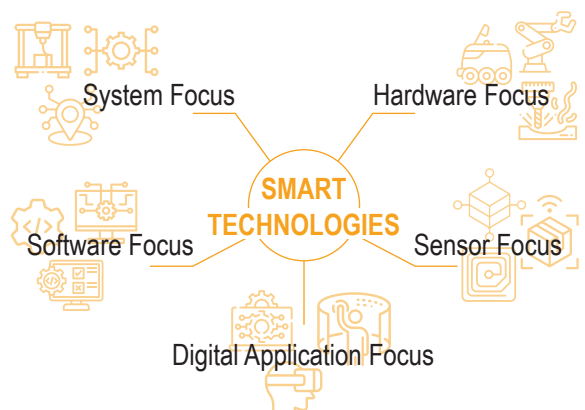
Update/upgrade of Systems
Incompatibility between systems and re training of personnel

Smart Industry Perspectives

System Focus

Hardware Focus

SMART TECHNOLOGIES

Software Focus

Sensor Focus

Digital Application Focus

Manufacturing Process Workshop

25 Industry Attendees

3 Keynote Speakers
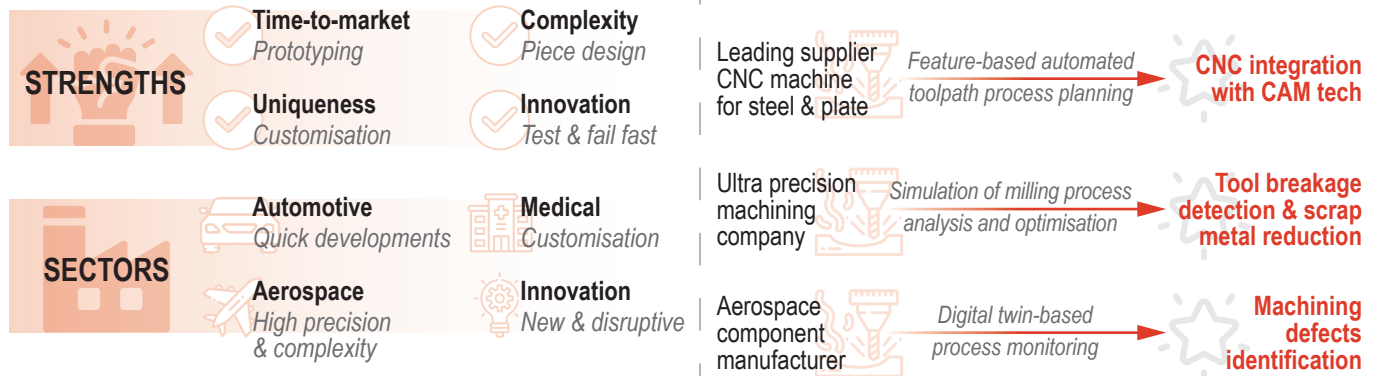
6 Field Experts

Keynote Speakers

"Advanced Manufacturing Technology in Twente"

Prof. Ian Gibson
Scientific Director
FIP-AM@UT

ADDITIVE MANUFACTURING (AM) + **ADVANCED MACHINING**

Philipp Ganser
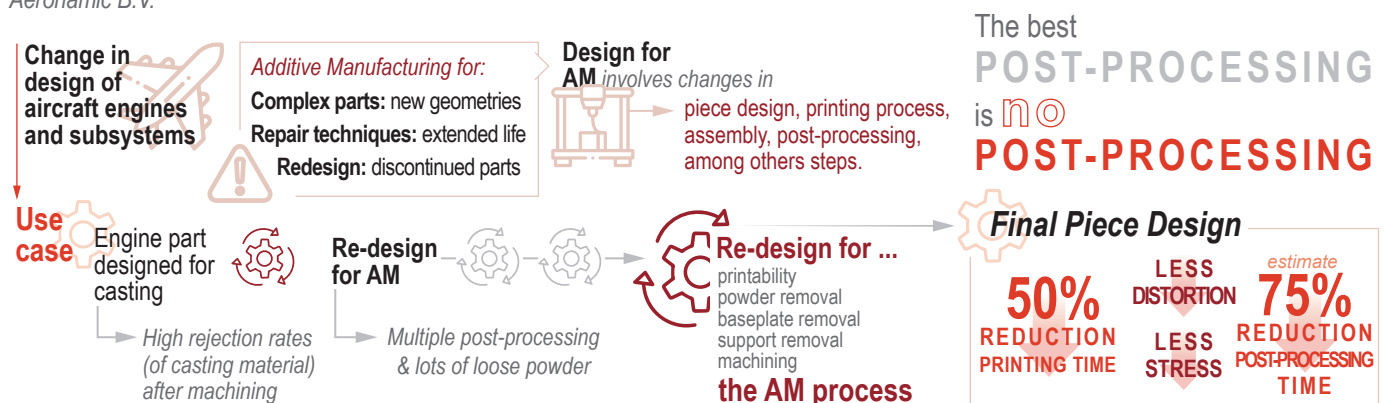*Head of Department*
"High Performance Cutting"
Fraunhofer IPT

STRENGTHS
- ✓ **Time-to-market** *Prototyping*
- ✓ **Uniqueness** *Customisation*
- ✓ **Complexity** *Piece design*
- ✓ **Innovation** *Test & fail fast*

SECTORS
- **Automotive** *Quick developments*
- **Aerospace** *High precision & complexity*
- **Medical** *Customisation*
- **Innovation** *New & disruptive*

Leading supplier CNC machine for steel & plate → *Feature-based automated toolpath process planning* → **CNC integration with CAM tech**

Ultra precision machining company → *Simulation of milling process analysis and optimisation* → **Tool breakage detection & scrap metal reduction**

Aerospace component manufacturer → *Digital twin-based process monitoring* → **Machining defects identification**

TWENTE REGION

- **Niche & high-tech capabilities** in manufacturing companies
- **Acquainted with AM**
- **Attention to** product, process & supply chain
- **Support for process** implementation
- **Focus on metal systems**
- **Exploring polymers & ceramics**

Ronny Blaauwgeers
Director Manufacturing Engineering
Aeronamic B.V.

"Advanced manufacturing in the aerospace industry"

Change in design of aircraft engines and subsystems

Additive Manufacturing for:
Complex parts: new geometries
Repair techniques: extended life
Redesign: discontinued parts

Design for AM *involves changes in* piece design, printing process, assembly, post-processing, among others steps.

The best **POST-PROCESSING** is no **POST-PROCESSING**

Use case — Engine part designed for casting → *High rejection rates (of casting material) after machining*

Re-design for AM → *Multiple post-processing & lots of loose powder*

Re-design for ... printability, powder removal, baseplate removal, support removal, machining — **the AM process**

Final Piece Design

50% REDUCTION PRINTING TIME

LESS DISTORTION
LESS STRESS

estimate **75% REDUCTION POST-PROCESSING TIME**

Discussion Topics

MACHINING
- Shorter time-to-market
- Incorporating AI & Digital Twins
- Reducing new staff learning curve
- Overview of entire process for new staff
- Difficulty to find combined expertise: traditional + advanced manufacturing

ADDITIVE MANUFACTURING
- Learning how to design for AM
- Multiple aspects need to be redesigned
- Potential for growth in medical sector
- Focus on reduction of post-processing
- Collaboration can lead to insights on newly developed materials for AM

AM Opportunities

AMII — Additive Manufacturing Implementation Investigation
- Current State Analysis
- Scenario Analysis
- Scenario Development
- Technical Implementation Plan