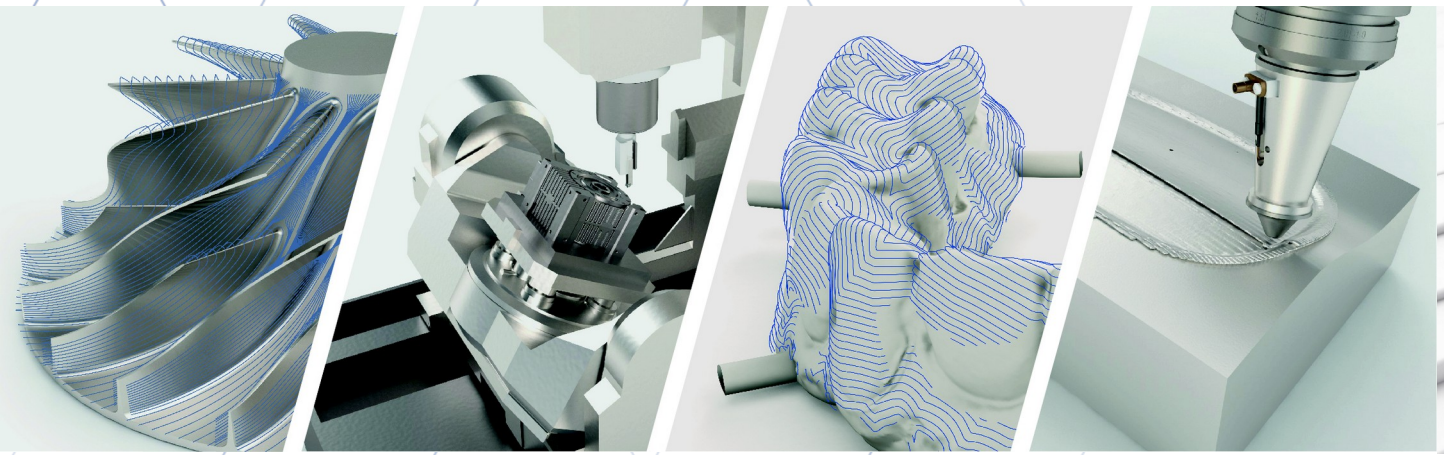
MIC 2022

ModuleWorks

Get There Faster.



The Future of Digital Manufacturing

Dr. Yavuz Murtezaoglu & Dr. David Plater

Presenters

MIC 2022

Dr. Yavuz Murtezaoglu

Managing Director

Dr. David Plater

Technical Director

ModuleWorks

Agenda

- Introduction
- Past: Looking Back
- Present: Digital Manufacturing (CAM) Today
  - Why the Name Change?
  - Key Drivers for Change
  - Manufacturing Process Chain
- Future: Digital Manufacturing (CAM) in 2030
  - Toolpaths: State-of-the-Art, Available Everywhere
  - Workflow: From Design to Machine
  - Automation
  - Specialized Applications
- How Can ModuleWorks Help You Provide Solutions for 2030?
- Conclusion

Past: Looking Back

MIC 2022

- Traditional CAD/CAM, PC-based
- CAD/CAM office, some shop floor systems
- Reliable toolpaths, but often need expert users

Past: Looking Back

MIC 2016

Real model

Scanned model

Milled model

3D printed model

Past: Looking Back

MIC 2018

- Guest Speaker:
  - Siemens SPLM
  - Huron
  - Sandvik

Past: Looking Back

MIC 2020

- 12 Guest Speakers Planned
- March 2020
- Cancelled due to COVID

MIC 2022

Agenda

- Introduction
- Past: Looking Back
- Present: Digital Manufacturing (CAM) Today
  - Why the Name Change?
  - Key Drivers for Change
  - Manufacturing Process Chain
- Future: Digital Manufacturing (CAM) in 2030
  - Toolpaths: State-of-the-Art, Available Everywhere
  - Workflow: From Design to Machine
  - Automation
  - Specialized Applications
- How Can ModuleWorks Help You Provide Solutions for 2030?
- Conclusion

Present: Digital Manufacturing (CAM) Today

MIC 2022

Why the Name Change?

From: CAM - Computer Aided Manufacturing

Suggests desktop-based PC and milling/turning

To: Digital Manufacturing

Highlights flexibility/range of hardware/processes
- 3D scanners, tablet PCs
- Robots, additive

Present: Digital Manufacturing (CAM) Today

MIC 2022

Key Drivers for Change

CNC with PC capability

Tablets/phones with PC capability

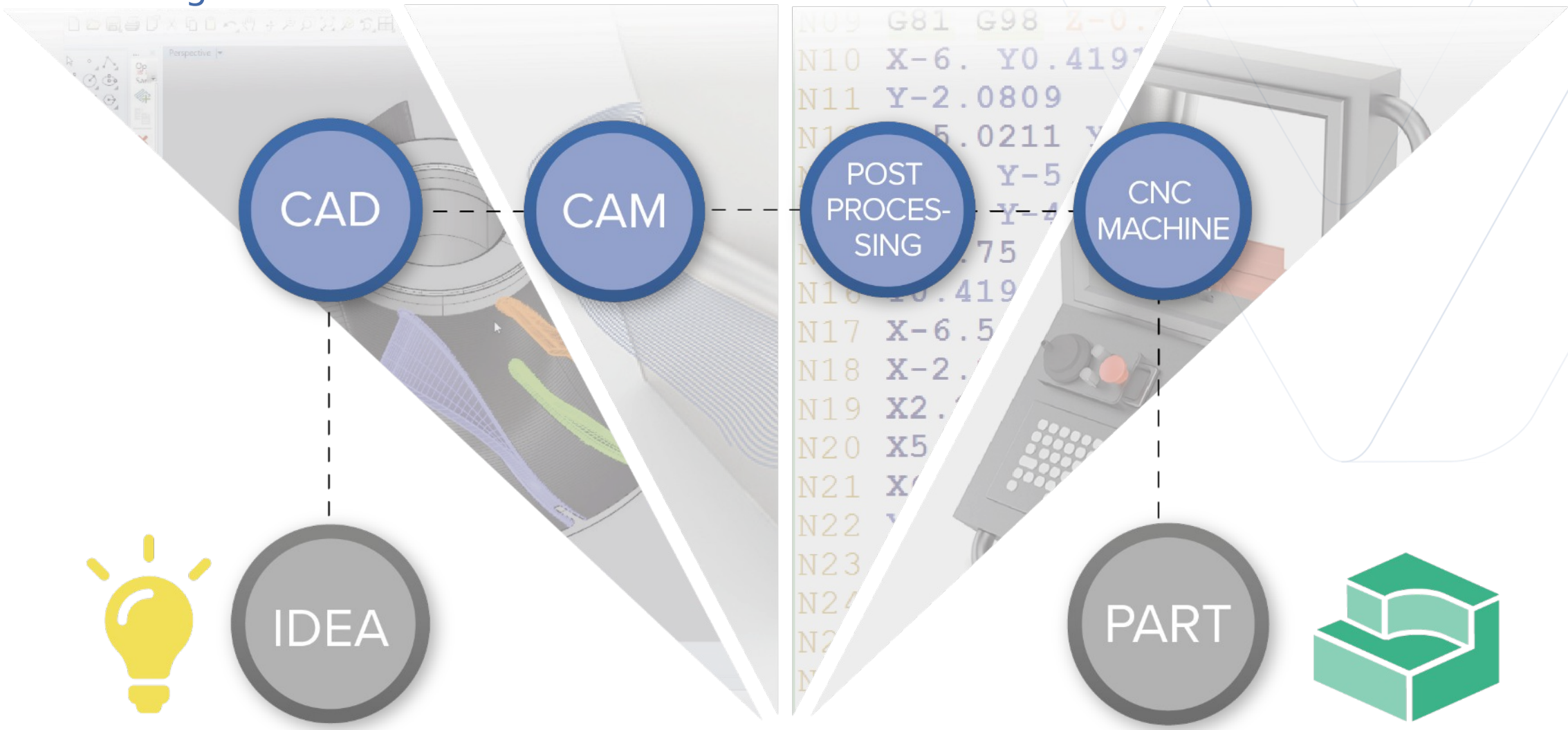
New hardware for Additive and Robotics

New software for Cloud and AI

Present: Digital Manufacturing (CAM) Today

MIC 2022

Manufacturing Process Chain



ModuleWorks

Agenda

- Introduction
- Past: Looking Back
- Present: Digital Manufacturing (CAM) Today
  - Why the Name Change?
  - Key Drivers for Change
  - Manufacturing Process Chain
- Future: Digital Manufacturing (CAM) in 2030
  - Toolpaths: State-of-the-Art, Available Everywhere
  - Workflow: From Design to Machine
  - Automation
  - Specialized Applications
- How Can ModuleWorks Help You Provide Solutions for 2030?
- Conclusion

Future: Digital Manufacturing (CAM) in 2030

MIC 2022

Toolpaths: State-of-the-Art, Available Everywhere

State-of-the-Art Toolpaths

Accurate, verified parameters (tool, material, machine, etc.)

Ease of use

Ability to use any hardware (desktop, laptop, CNC, tablets, phones)

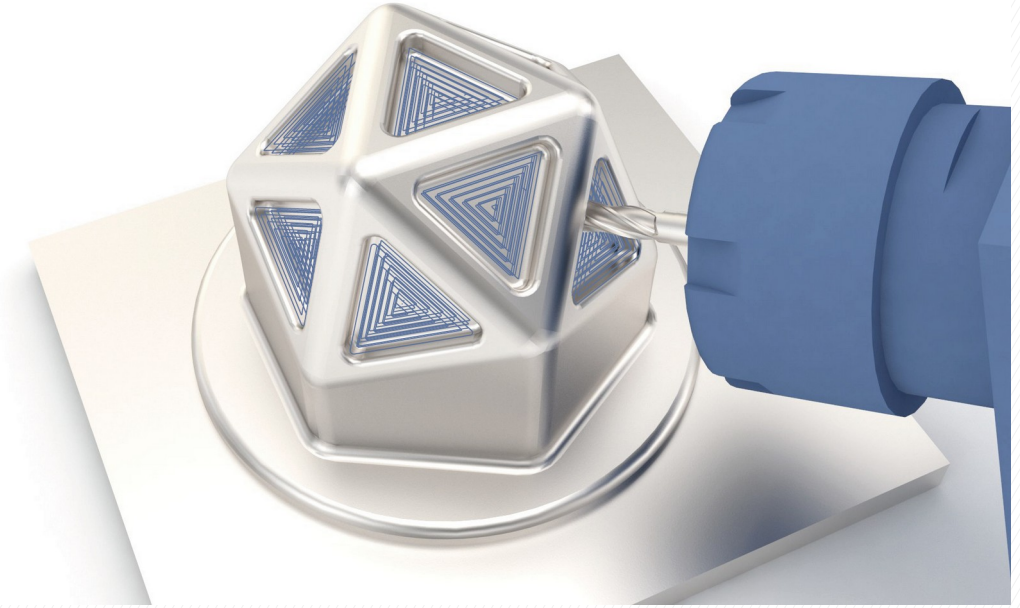
Data on Cloud, use of AI

Subscription licensing

Future: Digital Manufacturing (CAM) in 2030

Toolpaths: State-of-the-Art, Available Everywhere

State-of-the-Art Toolpaths



Future: Digital Manufacturing (CAM) in 2030

MIC 2022

Toolpaths: State-of-the-Art, Available Everywhere

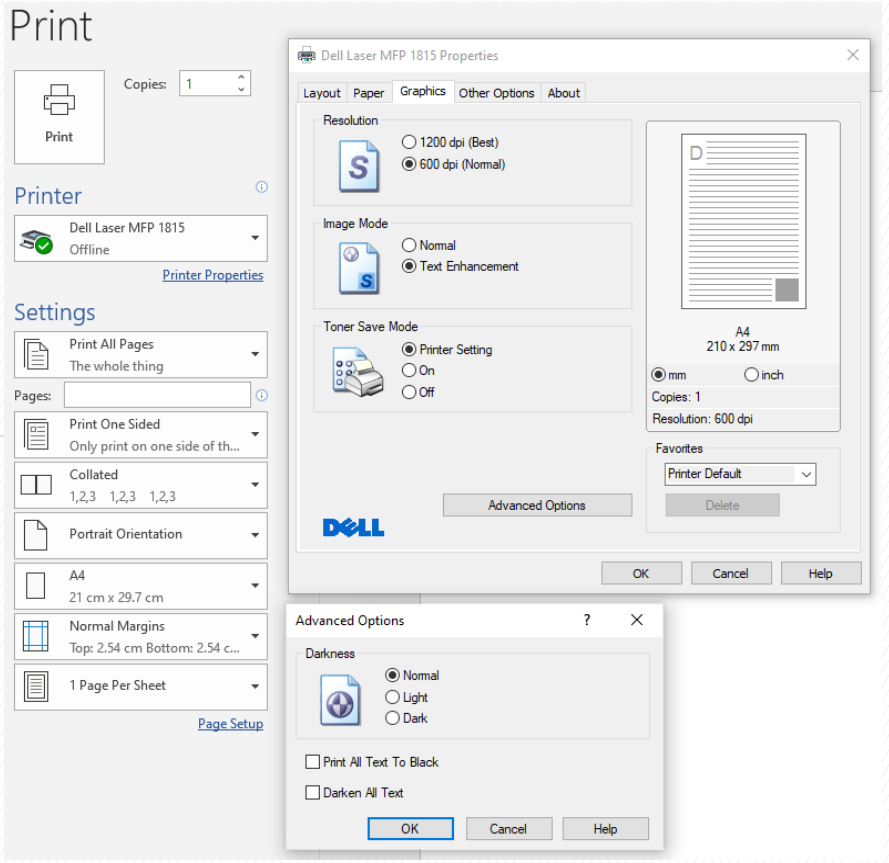
Accurate, verified parameters (tool, material, machir

Future: Digital Manufacturing (CAM) in 2030

MIC 2022

Toolpaths: State-of-the-Art, Available Everywhere

Ease of use



Future: Digital Manufacturing (CAM) in 2030

Toolpaths: State-of-the-Art, Available Everywhere

MIC 2022

Ability to use any hardware (CNC, tablet, phones, ..

Future: Digital Manufacturing (CAM) in 2030

MIC 2022

Toolpaths: State-of-the-Art, Available Everywhere

Data on Cloud, use of AI

Future: Digital Manufacturing (CAM) in 2030

Toolpaths: State-of-the-Art, Available Everywhere

MIC 2022

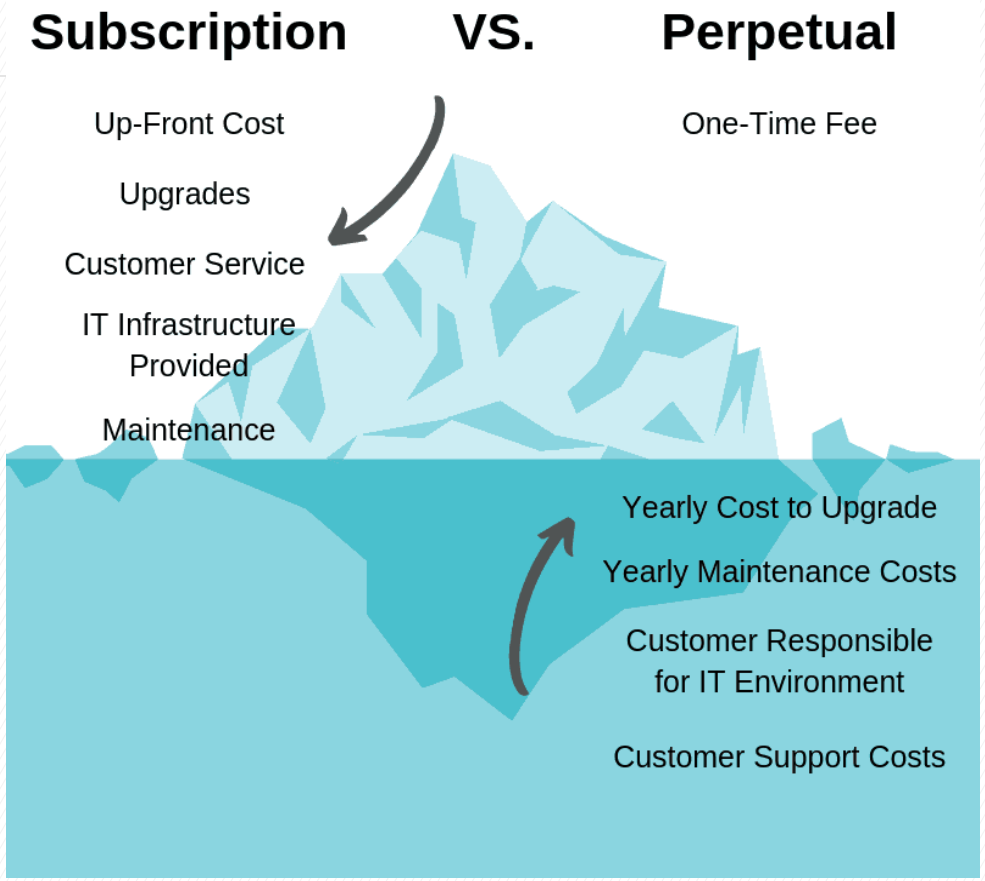
Subscription licensing

Gartner predicts that „by 2020, all new entrants and 80% of historical vendors will offer subscription-based business models.“

Trends in CAM:

- Move to subscription
- Increase in maintenance rates (software maintenance fees typically cost between 15 and 30% of the initial licensing cost)

Source: https://www.sensrtrx.com/subscription-vs-perpetual-license-subscription-software-cheaper/



Future: Digital Manufacturing (CAM) in 2030

MIC 2022

Workflow: From Design to Machine

Data Connectivity (In & Out)	CNC/Machine to be Self-Checking/Protecting	Realistic Simulation, Possibly with Augmented Reality

Future: Digital Manufacturing (CAM) in 2030

MIC 2022

Workflow: From Design to Machine

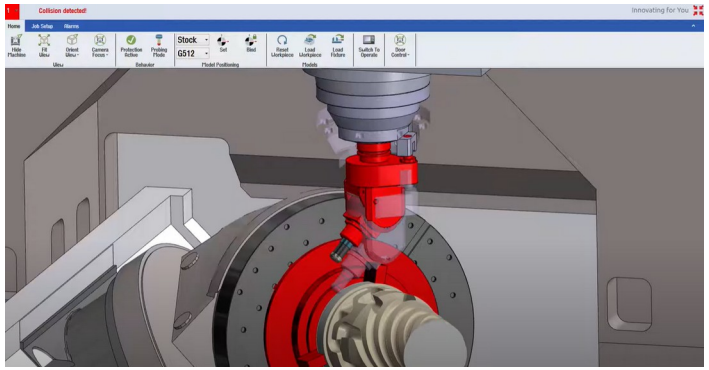
Data Connectivity (In & Out)

- Data Conectivity (In & Out)
  - Job Set-up Information

Future: Digital Manufacturing (CAM) in 2030

MIC 2022

Workflow: From Design to Machine



CNC/Machine to be Self-Checking/Protecting

- CNC/Machine to be self-checking/protecting
  - Collision Avoidance Systems

Future: Digital Manufacturing (CAM) in 2030

MIC 2022

Workflow: From Design to Machine

Realistic Simulation, Possibly with Augmented Reality

- Realistic Simulation
  - Possibly with Augmented Reality

Future: Digital Manufacturing (CAM) in 2030

MIC 2022

Automation

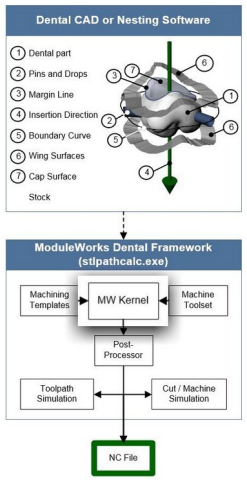
- Closed Systems
- Semi-Automatic Programming

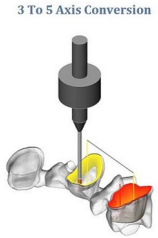
Future: Digital Manufacturing (CAM) in 2030

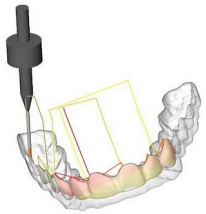
MIC 2022

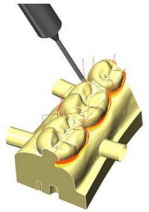
Automation

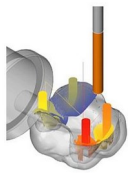
- Closed Systems
  e.g. Dental



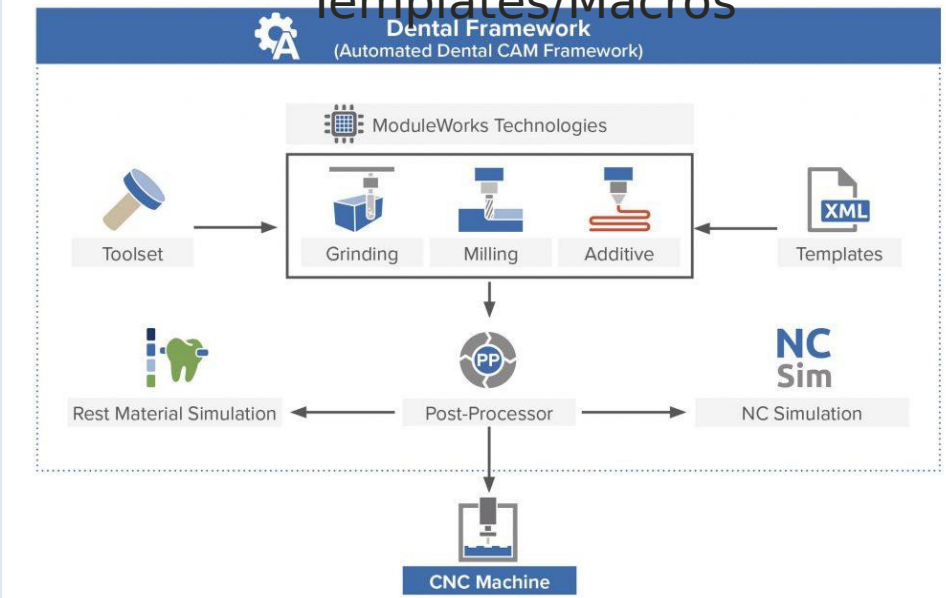








- Semi-Automatic Programming
  - Feature Finding/Processing
  - Templates/Macros



Future: Digital Manufacturing (CAM) in 2030

MIC 2022

Specialized Applications

- Robotics
- Additive
- Ultra-Precision Machining

Future: Digital Manufacturing (CAM) in 2030

MIC 2022

Specialized Applications

- **Robotics**
- Additive
- Ultra-Precision Machining

Future: Digital Manufacturing (CAM) in 2030

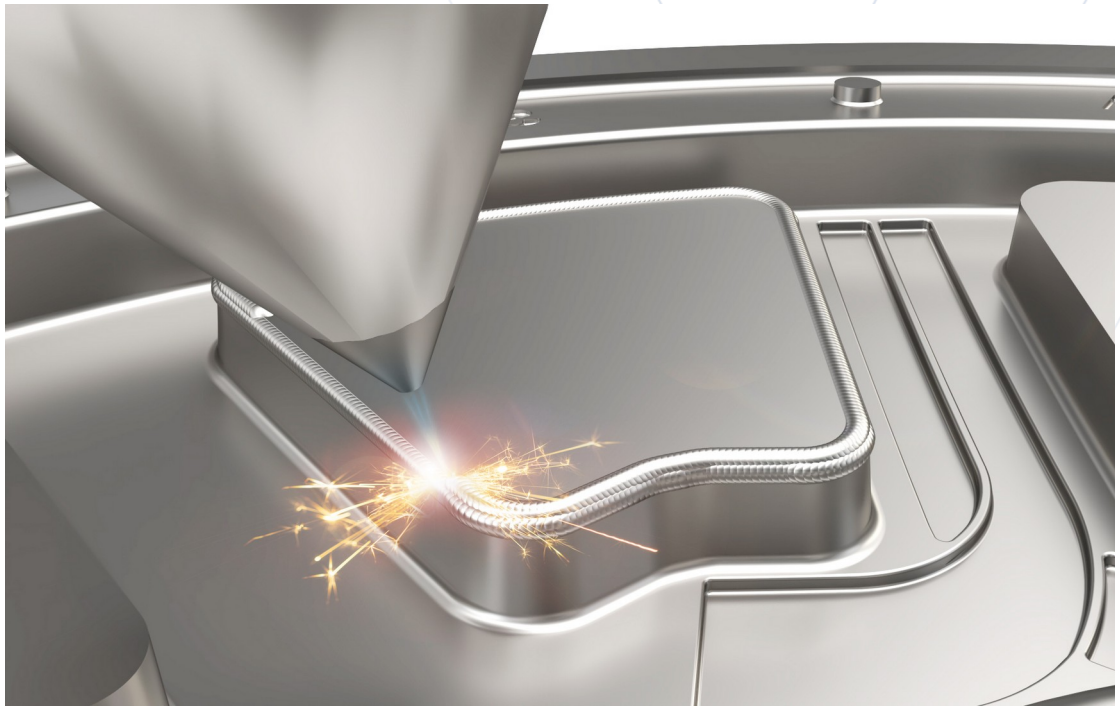
MIC 2022

Specialized Applications

Robotics

Additive

Ultra-Precision Machining



Future: Digital Manufacturing (CAM) in 2030

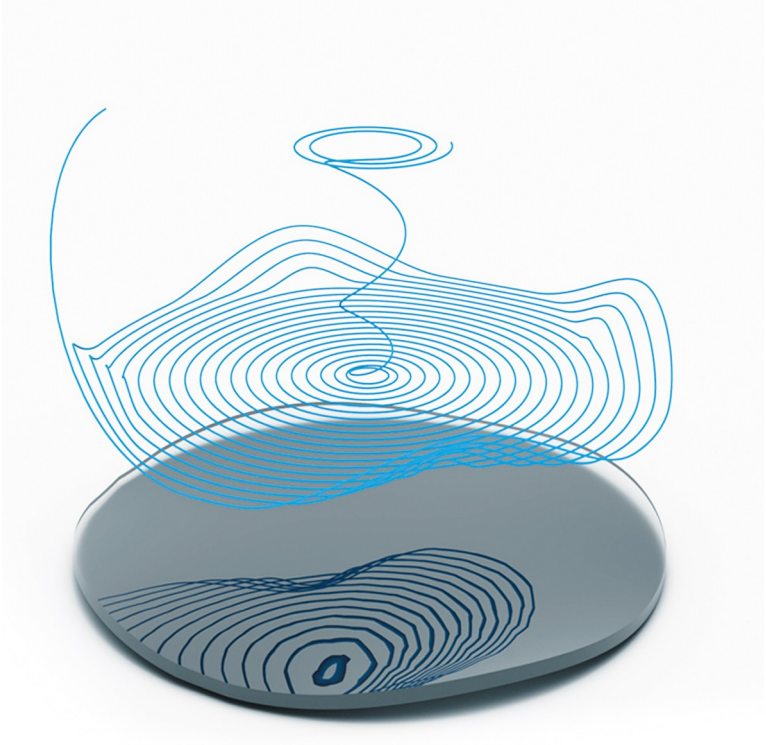
MIC 2022

Specialized Applications

Robotics

Additive

Ultra-Precision Machining (e.g. Optics)



ModuleWorks

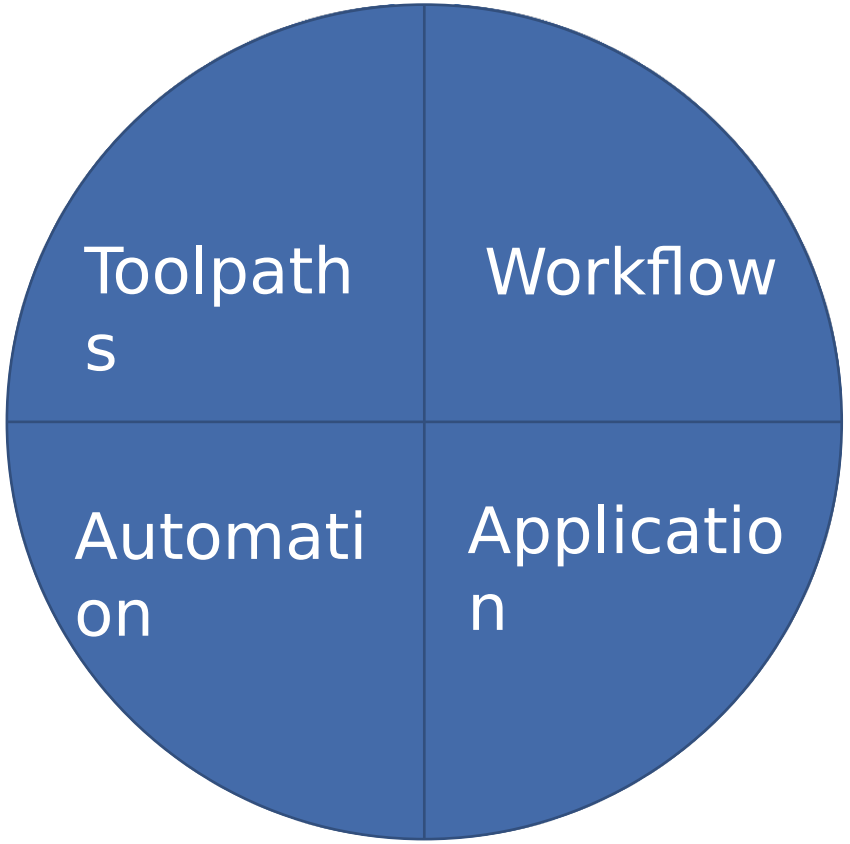
Agenda

- Introduction
- Past: Looking Back
- Present: Digital Manufacturing (CAM) Today
  - Why the Name Change?
  - Key Drivers for Change
  - Manufacturing Process Chain
- Future: Digital Manufacturing (CAM) in 2030
  - Toolpaths: State-of-the-Art, Available Everywhere
  - Workflow: From Design to Machine
  - Automation
  - Specialized Applications
- How Can ModuleWorks Help You Provide Solutions for 2030?
- Conclusion

How Can ModuleWorks Help?

MIC 2022

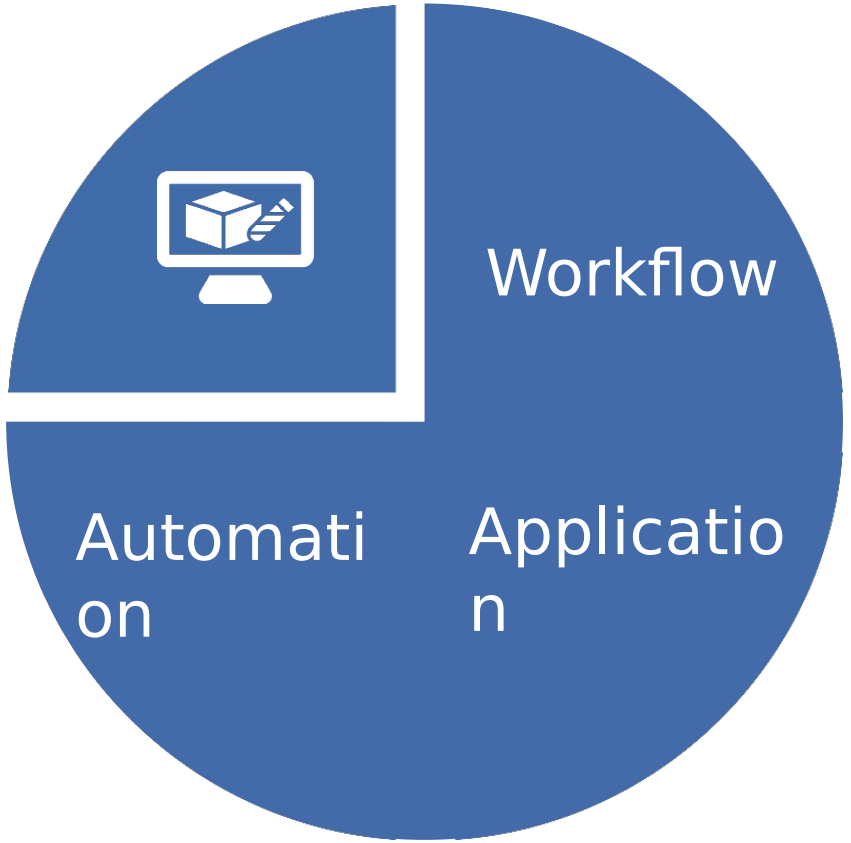
How can ModuleWorks help you provide solutions for 2030?



How Can ModuleWorks Help?

How can ModuleWorks help you provide solutions for 2030?

Digital Manufacturing

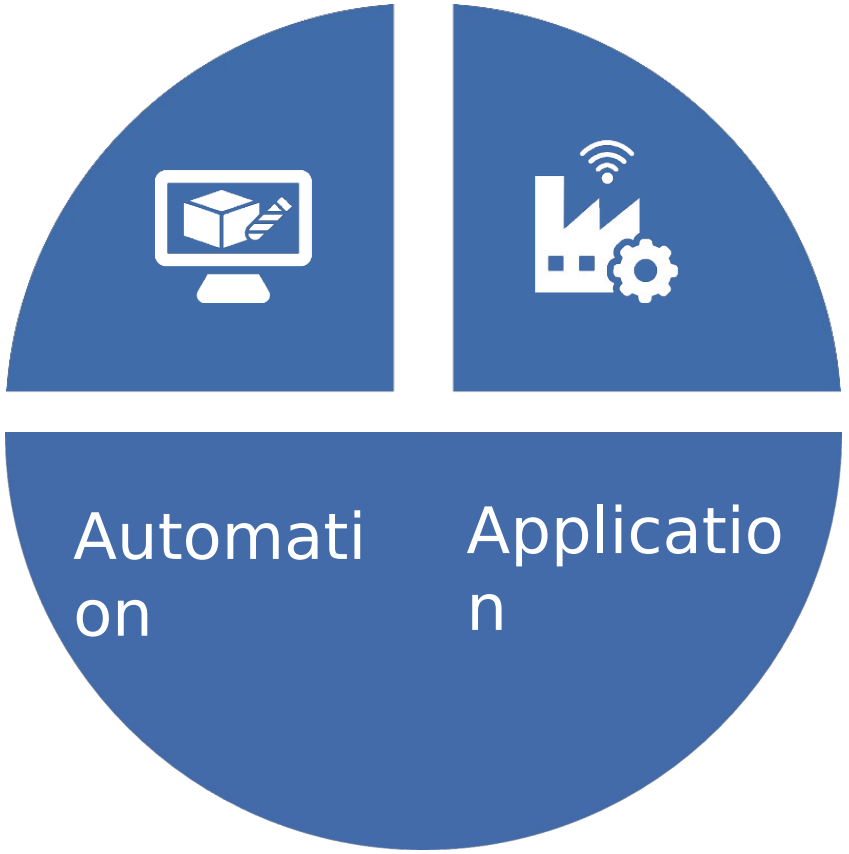


How Can ModuleWorks Help?

MIC 2022

How can ModuleWorks help you provide solutions for 2030?

Digital Manufacturing



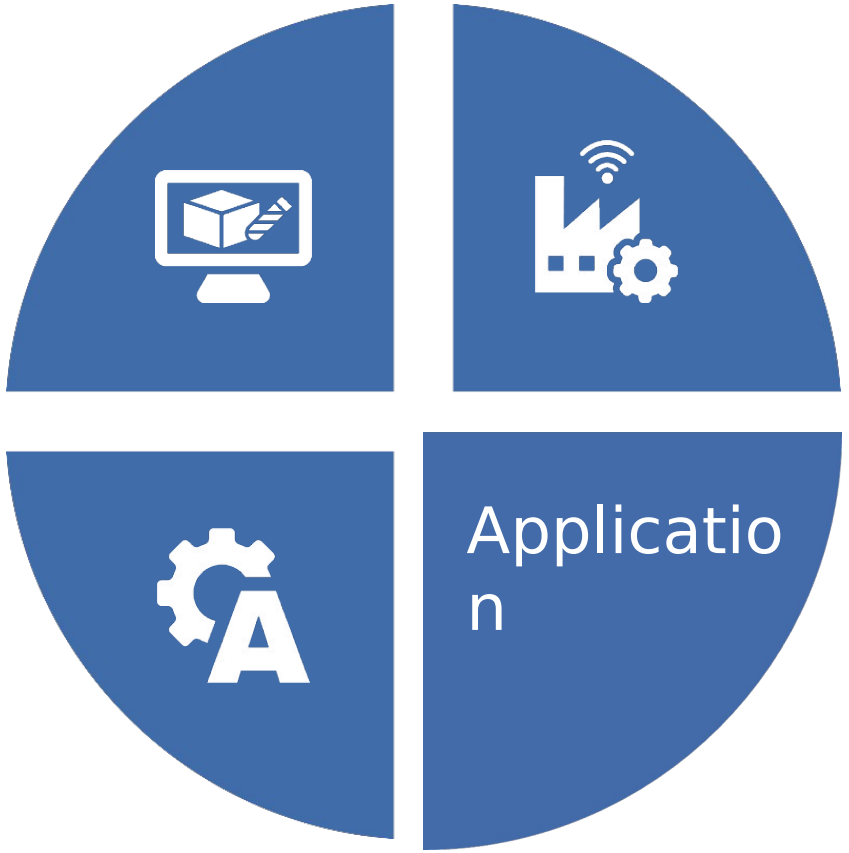
Digital Factory

How Can ModuleWorks Help?

MIC 2022

How can ModuleWorks help you provide solutions for 2030?

Digital Manufacturing



Digital Factory

CAM Automation & Digital Dentistry

How Can ModuleWorks Help?

MIC 2022

How can ModuleWorks help you provide solutions for 2030?

Digital Manufacturing

Digital Factory

CAM Automation & Digital Dentistry

Additive & Process Technologies

How Can ModuleWorks Help?

MIC 2022

Head Of Business

JULIA MEYER-HENDRICKS

Head of Business Development
Digital Manufacturing

SEBASTIAN WALLRAFF

Head of Technology
Digital Manufacturing

FABIAN TARARA

Head of Business Development
Digital Factory

MARK FOTI

Head of Technology
Digital Factory

BEN WEBER

Head of Strategic Partnerships
CAM Automation & Digital Dentistry

SOROOSH EGHBALI

Head of Business
CAM Automation & Digital Dentistry

LOTHAR GLASMACHER

Head of
Additive & Process Technologies

How Can ModuleWorks Help?

MIC 2022

- How can ModuleWorks help you provide solutions for 2030?

Toolpaths | Workflow | Automation | Applications

Digital Manufacturing

Guest Presenters:

- Sandvik Coromant *(Marko Stugbäck, Tobias Unosson)*
- PTC *(Jose Coronado)*
- Autodesk *(Al Whatmough, Craig Chester)*

How Can ModuleWorks Help?

MIC 2022

- How can ModuleWorks help you provide solutions for 2030?

Toolpaths | **Workflow** | Automation | Applications

Digital Factory

Guest Presenters:

- MITSUBISHI Electric *(Matteo Giugno, Jan Gesthuysen)*
- FANUC Corporation *(Dr. Steiger)*
- Siemens DIMC *(Johann Dietrich)*
- DMG MORI Digital *(Dr. Niederwestberg)*

How Can ModuleWorks Help?

MIC 2022

- How can ModuleWorks help you provide solutions for 2030?

Toolpaths | Workflow | **Automation** | Applications

CAM Automation & Digital

Guest Presenters:
- Oqton *(Mark Forth)*
- Amann Girrbach *(Falko Noack)*
- Spatial Corp *(Michael Stafne)*

How Can ModuleWorks Help?

MIC 2022

- How can ModuleWorks help you provide solutions for 2030?

Toolpaths | Workflow | Automation | **Applications**

Additive & Process Technologies

Guest Presenters:
- LT Ultra *(Kurt Haskic)*
- CNC Design *(Dominique Schär)*
- Lunovu *(Oliver Steffens)*
- TRUMPF *(Timo Degen)*

How Can ModuleWorks Help?

MIC 2022

Directors

BASTIAN PRANZAS
Development Director

MIGUEL JOHANN
Product Director

PAUL KITTEL
People Director

DROR BAR-LEV
Sales & Marketing Director

How Can ModuleWorks Help?

MIC 2022

Product Managers

NIREN DESHMUKH

DR.-ING. CHRISTIAN KLINGELHÖLLER

SEBASTIAN VIEBACH

MATHIAS ROHLER

How Can ModuleWorks Help?

MIC 2022

Organisation Team

DOMINIQUE BURROWS
Head of IT

STEPHANIE HIRSCHER
Marketing

ANJA HAUPTMANN
Administration Manager

JENS BEISSEL
Head of Global Marketing Communications

ModuleWorks

Agenda

- Introduction
- Past: Looking Back
- Present: Digital Manufacturing (CAM) Today
  - Why the Name Change?
  - Key Drivers for Change
  - Manufacturing Process Chain
- Future: Digital Manufacturing (CAM) in 2030
  - Toolpaths: State-of-the-Art, Available Everywhere
  - Workflow: From Design to Machine
  - Automation
  - Specialized Applications
- How Can ModuleWorks Help You Provide Solutions for 2030?
- Conclusion

Thank you
for your attention

ModuleWorks

Get There Faster.

www.moduleworks.com
info@moduleworks.com

Also follow ModuleWorks on: