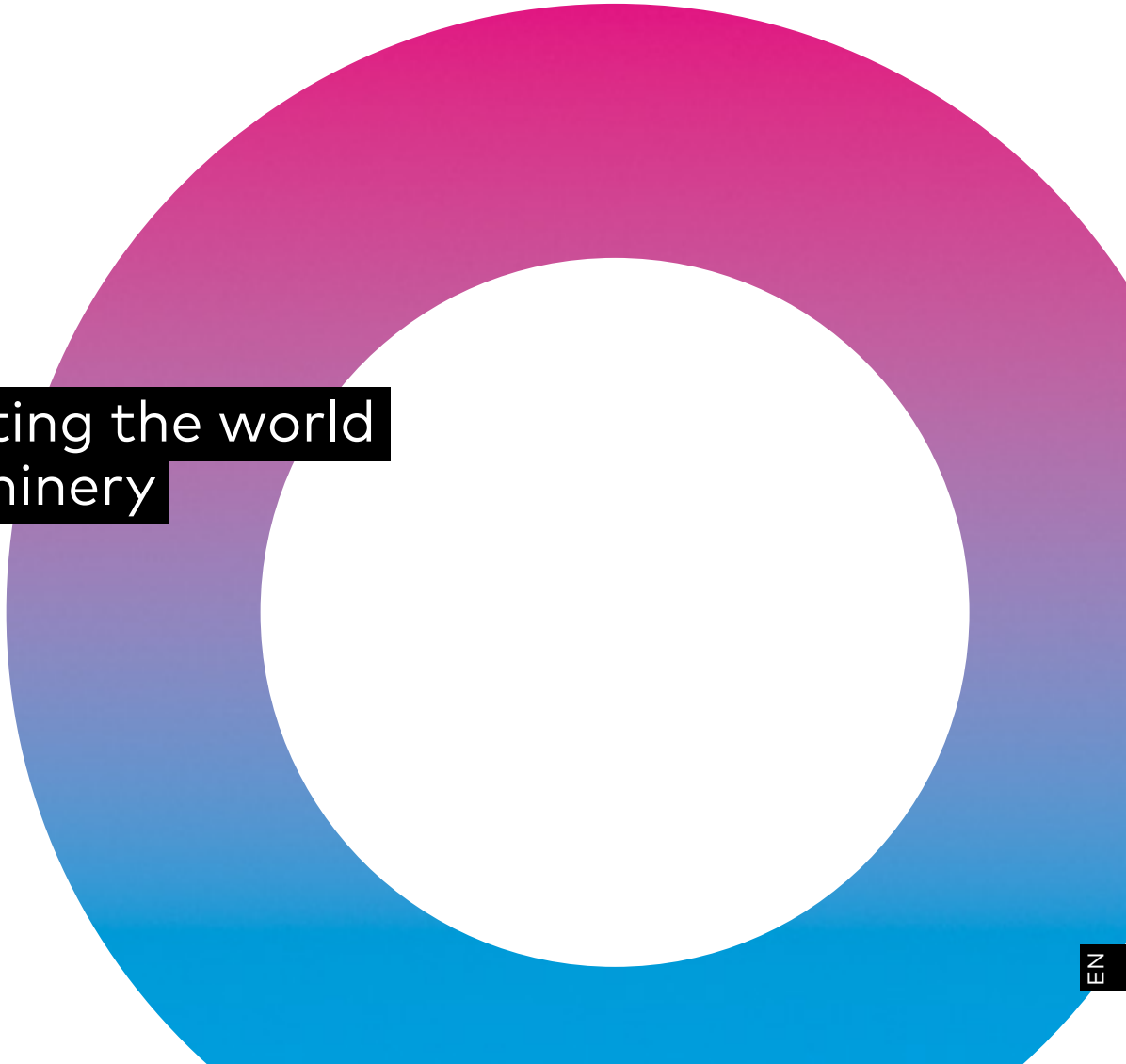
umati

universal
machine technology
interface



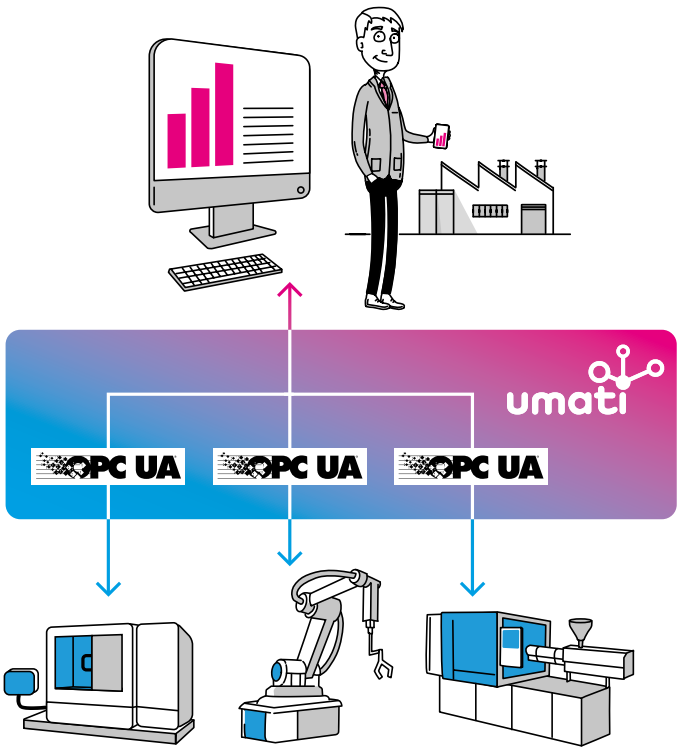
connecting the world
of machinery

BASED ON OPC UA

EN

the universal machine technology interface

Our promise: Make connectivity between machinery and software easy, secure and seamless – to help customers exploit added value from data.



How umati works: several machines with OPC UA servers using Companion Specifications endorsed by umati, implemented according to umati guidelines, are connected to one IT system with an OPC UA client.

Connectivity is key for all machinery in the 21st century. It means getting data in and out of devices and software systems – preferably via open, standardized interfaces.

umati is a global initiative for the promotion of open communication interface standards for machinery and production equipment.

Our mission is to provide true "plug and play" functionality in the field of machinery, so it becomes easier for users to participate in a data driven economy.

umati supports users and machine builders by building a strong international community; raising market awareness by joint marketing; ensuring identical implementation of the endorsed OPC UA specifications; and proving the power of an open, standardized data exchange ecosystems through live demonstrations.

umati relies on **OPC UA as the global interoperability standard**. Standardization work takes place in multiple "Joint Working Groups" with various sectors of the machine building industries and the OPC Foundation. This guarantees that the individual needs of different technologies are taken into consideration and ensures maximum transparency and the support of a strong global community.

OPC UA and the OPC Foundation:

- provide a **framework for standardized communication** (**HOW** to communicate)
- **support standardization** of specific needs for various technologies (**WHAT** is to be communicated)
- make the standards **available worldwide with no license fee**.

BASED ON OPC UA

a network of strong partners

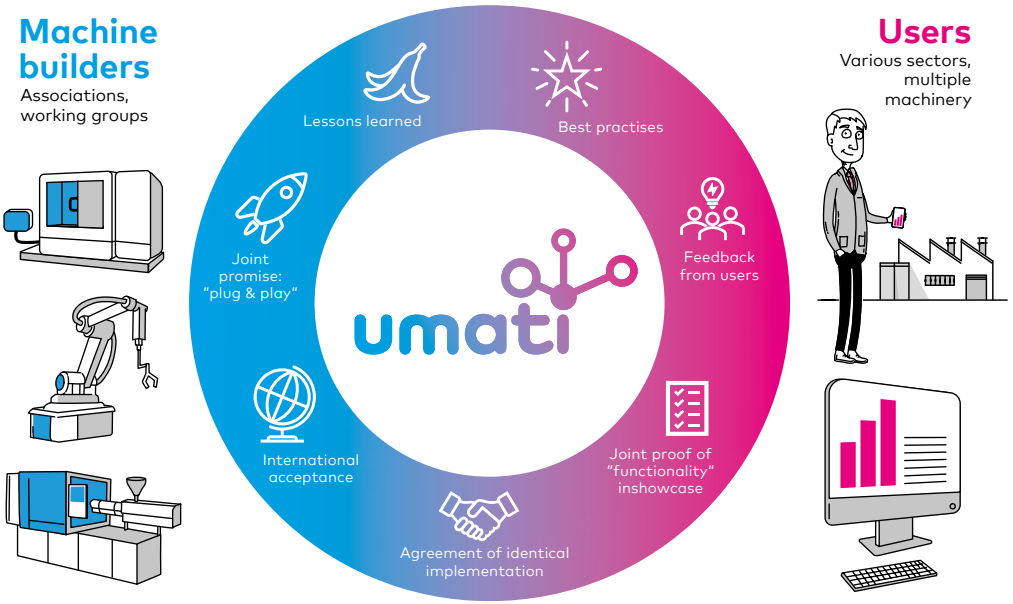
Our partners support the dissemination of OPC UA standards with a common implementation in the machinery industries.

umati partners:

- advertize the connectivity of their products through the **umati logo**
- have **easier access to their customers**
- benefit from **market stimulation** through strong marketing with high visibility
- demonstrate the **"plug and play"** user experience e.g. by taking part in demonstrations at trade fairs
- are part of a **global community** – for the industry by the industry
- have access to **exclusive** information and tools

The number of umati partners is growing continuously. To see who has already endorsed umati, visit **www.umati.org/partners**

umati brings together machine builders, software producers and users in a strong community. They share their experience to benefit from identical implementation of OPC UA standards.



data flow as a user experience

The umati live demonstration proves that connectivity across different machine technologies is a promise come true.

The umati live demonstration:

- provides a **"user experience"** for data flow
- has an **open, common set-up** to which participants can connect
- realizes **"criss-cross connectivity"** between machinery and multiple software applications even under trade show conditions

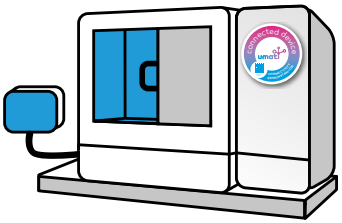
The umati community benefits from:

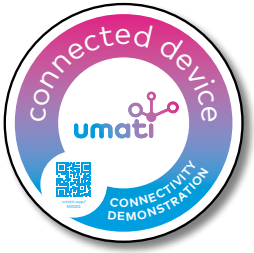
a common infrastructure for **secure connection** during a trade show and beyond

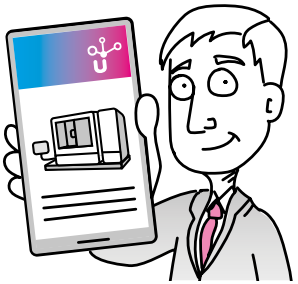
a vendor-independent **dashboard** to display data for a "machine status monitoring" use case

guidelines on getting connected – also applicable for testing and plug fests

comprehensive **marketing** (including design and templates) for all partners to increase market impact for customers and suppliers







How the umati live demonstration works:

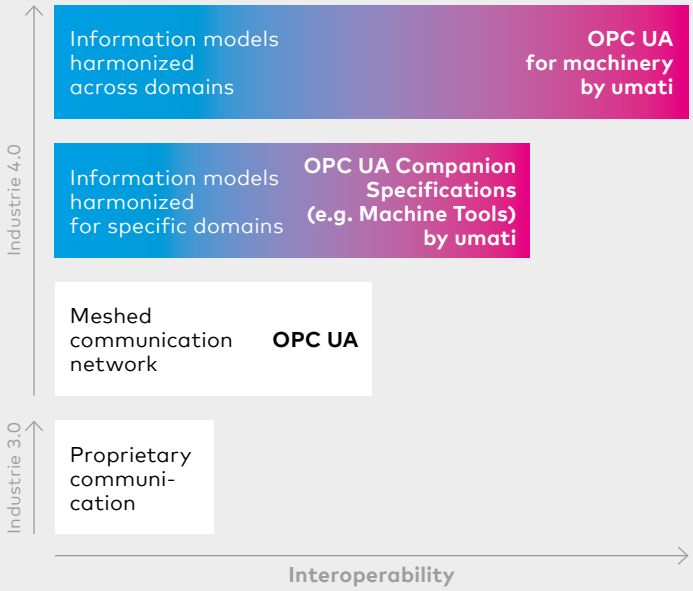
1.
Connected machines feature an umati sticker.

2.
Scan the QR code or type the shortcut link to access the umati dashboard and see the live data stream from the machine.

3.
Get an overview of all the connected machines at https://umati.app

OPC 40001 UA for **Machinery**

The **OPC 40001** series is applicable for the entire machine building industry.



The highest level of interoperability is achieved through cross-domain information models. One such information model is the OPC UA Companion Specification OPC UA for Machinery.

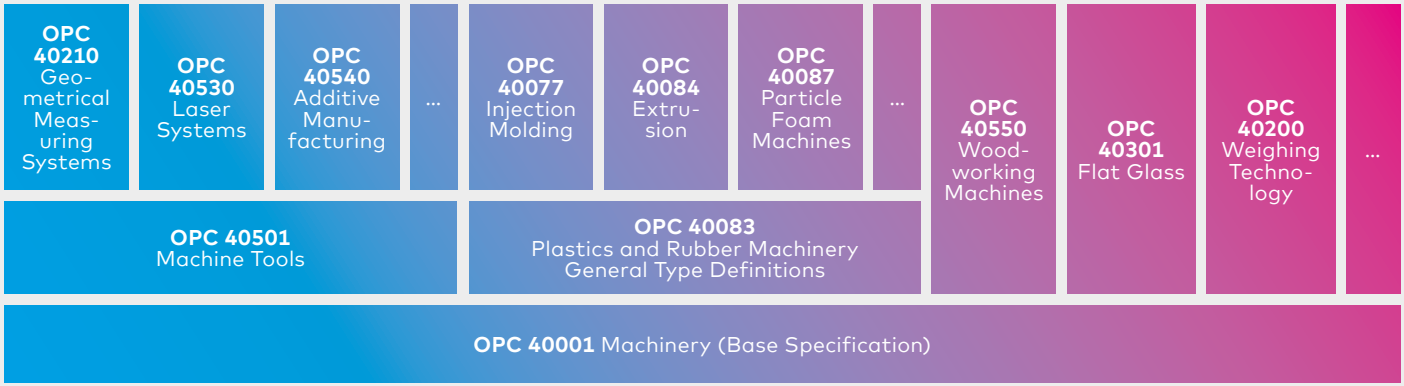
It contains various building blocks for machinery that allow use cases across different types of machines and machine components. These building blocks can either be used in other companion specifications or directly in an information model.

The first version was published in 09/2020 and was one of the first OPC UA companion specifications to be fully endorsed by the umati community. Recently, the version was updated to address additional use cases and will continue to be updated in the future.

Covered building blocks:

- **Machine Identification** and Nameplate
- Finding all **Machines in a Server** (OPC 40001-1)
- **Component Identification** and Nameplate (OPC 40001-1)
- Finding all **Components of a Machine** (OPC 40001-1)
- **Machinery State** (OPC 40001-1)
- **Counters** (OPC 40001-1)
- **Process Values** (OPC 40001-2)
- **Job Management** (OPC 40001-3)
- **Result Transfer** (OPC 40001-101)
- *Currently ongoing:* **Energy Management**

Harmonized Interfaces based on OPC UA for Machinery



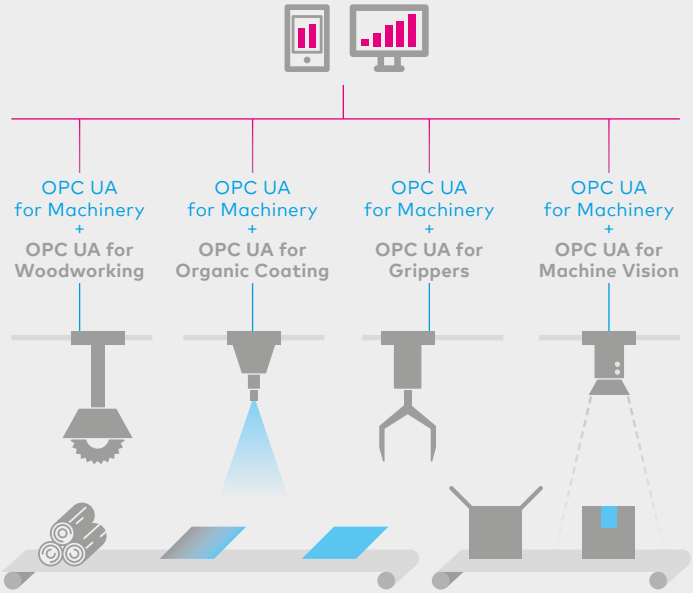
Identification

Machine and component identification is the foundation of the Plug & Work concept. Assets from a wide range of industries can be identified in the same way, enabling recognition between different participants, independent of machine and manufacturer.

Machinery State

The "Machinery State" module paves the way for various use cases like Machine Monitoring and KPI Calculations. Machine availability can easily be determined, resulting in high added value – especially in production where machines from different industries are used.

The definition of states enables the basic status of the machine to be expressed in a uniform way across all the different domains in mechanical process engineering. Examples of those states are, that the machine is currently executing an activity, that it is waiting to start or resume an activity, or that it is out of service.



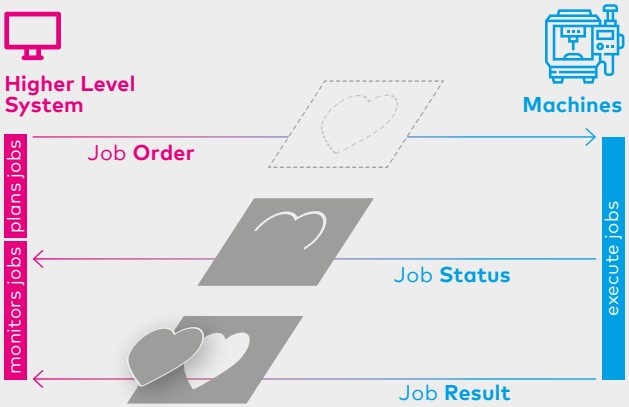
OPC UA for Machinery can be used across the entire landscape of production machinery, either standalone or in combination with domain-specific specifications.

Job Management

The job management information model defined in OPC UA for Machinery builds on the ISA 95 Job Control specification. In addition, all job parameters are aligned with the terminology from ISO 22400. Thus, it is a highly harmonized information model with a wide range of usable job parameters. These include the job name, a start time, an end time, a job result, and information about the current status of the job. With the help of the job management model, use cases such as traceability and quality assurance can be supported in addition to the obvious use cases such as monitoring and controlling of jobs.

Driven by the industry

OPC 40001 was developed under the umbrella of VDMA, the Mechanical Engineering Industry Association, in a Joint Working Group with the OPC Foundation. It followed an initiative by a number of technology-specific first-mover standardization groups from different sectors of the machine building industries. All domain-specific working groups support OPC UA for Machinery as the basis for interoperability.



The Job Management model enables a user to issue job orders from a higher-level system to a machine. The user can also update and manage the execution of the job orders and get information while the jobs are being executed or afterwards.

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The specification is available free of charge from **umati.org/ua4m**

OPC 40010 UA for **Robotics**

The **OPC 40010** series provides standardized OPC UA information models for industrial robots.

The VDMA OPC Robotics Initiative was established in 2017 to bring together robot manufacturers with the aim of discussing and developing a common, usable, future-proof interface for industrial robots. OPC UA was identified as the obvious choice for the creation of such a standard since it provides feature-rich standardized mechanisms to describe vendor-independent interfaces supported by a strong information model.

As a joint working group, the initiative is organized by VDMA Robotics + Automation and supported by the OPC Foundation. Over the last years, the core working group of this initiative, a group of experts from 14 companies, have developed Part 1 of the VDMA OPC Robotics Companion Specification. Part 1 is the first step in the gradual design-in towards a fully connected Industrial Internet of Things (IIoT). It enables vertical provisioning of information from the lower (Sensor/Actuator) to the higher (Control, SCADA, MES, Cloud) levels of the automation pyramid.

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The specification is available free of charge from **umati.org/ua4robotics**

The **OPC Robotics Information Model** can be used to describe all current and future robotics systems:

- **industrial robots**
- **mobile robots**
- **additional axes**
- **control units**
- **peripheral devices**, which do not have their own OPC UA server

Part 1 covers these use cases:

- **Structuring of an integrated robot system** into its constituent components
- **Vendor-independent access** to asset information of all integrated robot systems and their components
- **Representation of motion devices** containing one or more axes.
- **Representation of controllers** including their software and task controls.
- **Representation of common safety states** of a motion device system.
- **Common condition monitoring parameters** of the components of an integrated robot system
- **Identification of anomalies** based on the condition monitoring parameters

Ongoing work to extend Part 1 with:

- addIns for **remote operation** i.e. loading, unloading, starting, stopping programs.
- addIns to **provide the single point of control mechanism**.
- a **dialog mechanism** to handle system notifications that need to be accepted by the operator.

OPC 40077 UA and OPC 40079 UA for **Injection Molding Machines**

The **OPC 40077** and **OPC 40079** specifications provide standardized OPC UA information models for vertical and horizontal communication of injection molding machines.

OPC 40077
OPC 40077 focuses on data exchange between injection molding machines (IMM) and a higher-level manufacturing execution system (MES). The aim is to provide a vendor-independent interface for easier quality assurance, order and data set management.

The following functionalities are covered:

- **General information** about the IMM (manufacturer, model, serial number etc.), current configuration and status of the IMM
- **Job management**: Information on the jobs running on the machine and the parameters of the production cycles and methods to send and start jobs from the MES to the IMM
- **Dataset management**: Allows datasets to be transferred between IMM and MES in order to create a central repository of datasets. These include information on nominal process parameters related to the IMM but also to installed handling systems.

OPC 40079
The interface for data exchange between injection molding machines and robots described in OPC 40079. The target of OPC 40079 is to provide a unique interface for IMM and robots independent of manufacturer to ensure compatibility. The next versions are going to add further Facets which will cover unlimited equipment and other topics for higher level of integration on the production floor.

The following functionalities are covered:

- **Realtime exchange of signals** via PubSub to prevent mechanical collisions
- **Position signals** from the IMM: 1 mold, 2 ejectors, 10 cores and 1 additional axis
- **Enabling signals from the robot** to the IMM to enable/disable movements of the IMM depending on the robot position
- **Multiple pub sub connections**
- **Part tracking**
- **Signals from the IMM** representing the availability of parts in each mold
- **Signals from the robot** on inserting and removing parts
- **Exchange of production and quality datasets** between machine and robot

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The specifications are available free of charge from **umati.org/ua4pr77** and **umati.org/ua4pr79**

OPC 40082 UA and OPC 40086 UA for **Interfacing Plastic and Rubber Machinery**

The **OPC 40082** and **OPC 40086** specifications provide standardized OPC UA information models for interfacing plastic and rubber machinery with material supply systems and other peripherals.

OPC 40082
OPC 40082 defines OPC UA interfaces to peripheral devices for plastics and rubber machines. The Companion Specification consists of several parts, focusing on different device types.

OPC 40082-1 to 40082-3 describe the OPC UA interfaces for:
- Part 1: **Temperature control devices**
- Part 2: **Hot runner devices**
- Part 3: **Liquid silicone and rubber dosing systems**

The target of OPC 40082-1 to OPC 40082-3 is to provide a standardized interface for these devices from different manufacturers to ensure compatibility.

The following functionalities are covered:
- **General information** about the device
- **Status information**
- **Process data**

OPC 40086
OPC 40086 defines information models for material supply systems in the plastics sector. The entire path of the material from silo to the processing machine is covered.

The specification deals with the handling of granules, powder or liquids in a material supply system and addresses systems of varying complexity. Furthermore, all process data generated during the process in the material supply system should be recorded and made available to other systems.

OPC 40086 covers the following functionalities:
- **General information** about the Material Supply System and its materials: e.g. filling level, temperature, etc. Each of the devices has a material input (incl. condition) and a material output.
- **Job management**: The delivery of material by the MSS is organized by jobs. For each job, a target machine is prescribed, and the MES orders material according to a defined recipe which is provided at a specified transfer point.
- **Traceability**: An event is generated for each batch part that leaves the MSS. This contains a unique identifier, which can later be used to determine the history of the supplied materials.

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The specifications are available free of charge from **umati.org/ua4pr82-1**, **umati.org/ua4pr82-2**, **umati.org/ua4pr82-3** and **umati.org/ua4pr86-1**

OPC 40083 UA for **Plastic and Rubber Machinery**

The **OPC 40083** specification provides standardized OPC UA information models for the plastic and rubber machinery industry.

This collection of specifications is jointly developed with the OPC Foundation and the European umbrella association of the plastics and rubber machinery industry called EUROMAP. The initiative was launched in May 2014 and aims to define OPC UA information models for various plastic and rubber machines.

EUROMAP provides technical recommendations for plastics and rubber machines. In addition to standards for machine descriptions, dimensions and energy measurement, interfaces between machines feature prominently.

The primary goal of this initiative is to increase the quality and efficiency of the production process, which is only possible with standardized interfaces. Plastics and rubber machines are usually integrated in a production line and/or connected to superordinate systems like Manufacturing Execution Systems (MES). Therefore, the joint working group OPC UA Plastics and Rubber Machinery develops Companion Specifications for both horizontal and vertical communication.

OPC 40083 is a Companion Specification for general information related to plastics and rubber machinery. The idea is that object types used for different machines and applications are defined once only in OPC 40083. There are specific Companion Specifications for the concrete applications (**OPC 40077, 40079, 40082, 40084, 40086**). Their generally valid results are then summarized in EUROMAP 83.

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The specification is available free of charge from **umati.org/ua4pr83**

OPC 40084 UA for **Extrusion Lines**

The **OPC 40084** series of specifications provide standardized OPC UA information models for whole extrusion lines and individual components.

The working group on OPC 40084 develops information models for rubber and plastics extrusion. The intention is to ensure interoperability between the different machines in an extrusion line. In particular, the monitoring of the overall production and the management of production orders are possible use cases.

OPC 40084-1 provides general types that are used for extrusion. Together with OPC 40083, which defines general type definitions for the complete sector plastics and rubber machinery, it is the basis for all other parts of OPC 40084.

OPC 40084-2 describes the interface between extrusion lines and manufacturing execution systems (MES) for data exchange. MES are used for collecting the information generated by extrusion lines at a central point for easier quality assurance and job and dataset management. The target of OPC 40084-2 is to provide a unique interface for extrusion lines and MES from different manufacturers to ensure compatibility.

The following functionalities are covered:
- **General information** about the extrusion lines, current configuration and status of the extruder line.
- **Job management**
- **Recipe management** including temperatures, dosing volumes etc.

OPC 40084-3 describes the interface between extruders in an extrusion line and MES for data exchange. The target of OPC 40084-3 is to provide a unique interface for extruders and MES from different manufacturers to ensure compatibility.

The following functionalities are covered:
- **General information** about the extruder (manufacturer, model, serial number etc. etc.), current configuration and status of the extruder.
- **Recipe management**: Extruders store their configurations in so-called recipes. These include information on nominal process parameters (temperatures, dosing volumes etc.).

OPC 40084-4 to **OPC 40084-12** describe the data exchange interface for various components as part of an extrusion line. The components include:
- Part 4: **Haul-off**
- Part 5: **Melt pump**
- Part 6: **Filter**
- Part 7: **Die**
- Part 8: **Pelletizer**
- Part 9: **Cutter**
- Part 10: **Calibrator**
- Part 11: **Corrugator**
- Part 12: **Calendar**

The interfaces are used by
- **MES** for collecting the information generated by extrusion lines at a central point for easier quality assurance and job and dataset management.
- **Line controllers** to monitor and set process parameters.

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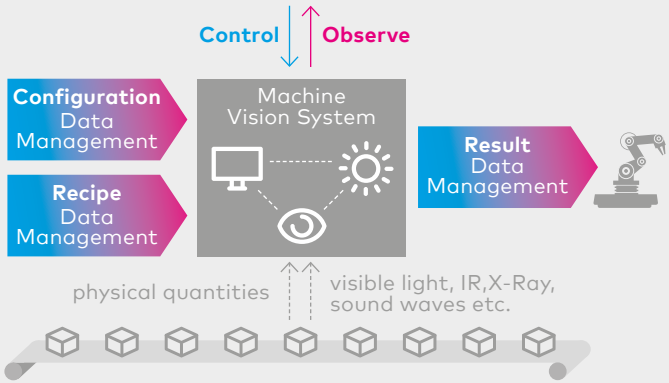
The specification is available free of charge from **umati.org/ua4pr84**

OPC 40100 UA for **Machine Vision**

The **OPC 40100** series provides standardized OPC UA information models for Machine Vision systems.

The VDMA OPC Machine Vision Initiative, launched in January 2016, released Part 1 of the OPC Machine Vision Companion Specification in 2019, and Part 2 will be released in 2023. As a joint working group, the initiative is organized by VDMA Robotics + Automation and supported by the OPC Foundation.

The core working group that is developing the specification consists of 17 experts from 10 companies. Due to the enormous variations in machine vision systems all over the world, it is very hard to generalize vision system data. Therefore Part 1 focuses on data management methods without restricting the content of the same. Behavior control and observation of a vision system are the key objectives solved in Part 1. The generic state machine approach introduced in Part 1 of the specification enables monitoring and control of system behavior.



The initiative is currently concluding the development of Part 2 of the specification which aims to define a generic structure and the components of a machine vision system. It describes the relationship between the components and their condition monitoring parameters.

Part 1 describes the **functionality of a machine vision system** and covers these use cases:

- **Configuration Management**
- **Recipe Management**
- **Result Management**
- **Safety State Management**
- **Machine vision system state with State Machines**

Part 2 describes **the structure of a machine vision system**, its components and the relationships between them and covers these use cases:

- **Identification of the system and its components**
- **Condition Monitoring**
- **Relationship between components**
- **Future proof information model** to allow integration of future detailed companion specifications for the components of a machine vision system

The members of the initiative are:

- **Asentics**
- **Basler**
- **Bosch**
- **EVT**
- **Isra Vision**
- **Kuka**
- **MVTec**
- **PeerGroup**
- **SAC**
- **Scanware**
- **Stemmer**
- **Vitronic**

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The specification is available free of charge from **umati.org/ua4mv**

OPC 40200 UA for **Weighing Technology**

With the **OPC 40200** for Weighing Technology, it is possible to exchange relevant data and configuration parameters for different types of scales.

This standardization enables international application, facilitating cooperation between different countries and industries. Scales are used in a wide range of applications to optimize processes and comply with legal requirements. By using standardized interfaces, communication between scales and other systems along the entire value chain is simplified and accelerated. The OPC UA interface covers a wide range of scale types, including self-actuated scales, truck scales, and recipe scales, demonstrating its versatility and applicability in various fields.

The OPC 40200 includes the following **tasks and use cases**:

- Automatic scales for individual weighing
- Truck scales
- Continuous scales – Differential weighing feeders
- Automatic filling scales
- Counting scales
- Formulation scales
- Totalizing scales

The Companion Specification was jointly developed by:

- **Bizerba**
- **Espera**
- **Hottinger Brüel & Kjaer**
- **Kern & Sohn**
- **Mettler Toledo**
- **Minebea Intec**
- **RHEWA**
- **Sartorius Lab Instruments**
- **Schenck Process**
- **Siemens**
- **SysTec**
- **Wipotec**

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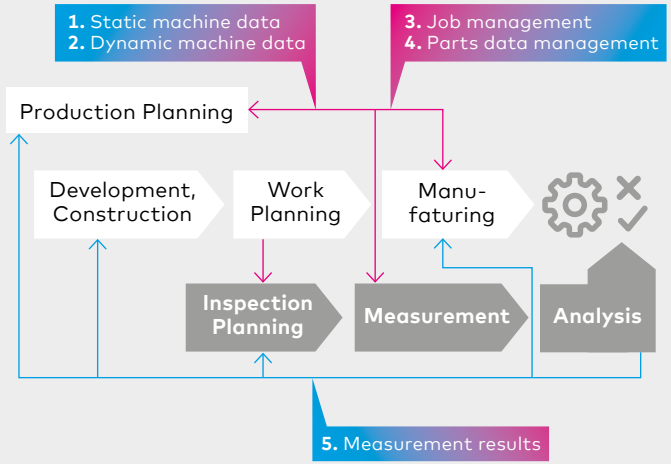
The specification is available free of charge from **umati.org/ua4wt**

OPC 40210 UA for **Geometrical Measuring Systems**

The **OPC 40210** provides information for data transfer to and from geometrical measuring systems.

For geometrical measuring systems (GMS), such as coordinate measuring systems, form and surface measuring machines as well as multi-point measuring machines, a VDMA working group is defining OPC 40210 UA for Geometrical Measuring Systems in coordination with the OPC Foundation. The aim is to provide information for data transfer to and from geometrical measuring systems via a uniform interface that can be used by digital data processing systems such as MES systems.

For geometrical measurement technology, as the "information supplier" on the quality of production, digitalization has a special significance in the interaction with other production systems. This interaction, which is also referred to as interoperability of machines and systems, enables companies to participate in new digital structures and is a basic prerequisite for new digital business models. Through interoperable interfaces, machines from different manufacturers can be efficiently integrated into existing and new production landscapes.



The Companion Specification considers the following use cases:

1. **static machine data** (identification of the GMS)
2. **dynamic machine data** (current state/status of the GMS)
3. **job management** (monitoring of measurement routines)
4. **parts data management** (identification of parts and related information)
5. **measurement results** (management of the provision of measurement results)

The Companion Specification was jointly developed by:

- **Hexagon Manufacturing Intelligence**
- **Jenoptik**
- **Mahr**
- **MARPOSS**
- **Mitutoyo**
- **OGP Messtechnik**
- **Wenzel Metrology**
- **ZEISS Industrial Quality Solutions**

The Companion Specification developed by the industry will be presented at CONTROI 2023 where its practical applicability will be demonstrated on a dashboard. This dashboard (**umati.app**) is provided by the umati community, which promotes the dissemination and use of open interface standards based on OPC UA.

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The specification is available free of charge from **umati.org/ua4gms**

OPC 40444 UA for **Textile Testing Devices**

The **OPC 40444** for Textile Testing Devices presents an OPC UA Information Model designed to seamlessly integrate a diverse range of textile testing devices into Manufacturing Execution Systems (MES) and other IT systems.

Specifically tailored to textile testing instruments utilized in applications such as the spinning industry, research institutes, quality control laboratories, and industrial production control, this companion specification streamlines the transfer of information to and from these devices.

By offering a standardized interface, manufacturers of textile testing devices can ensure compatibility and interoperability across various systems. It is important to note that online testing devices are not covered within this scope. The specification encompasses a comprehensive set of functionalities for textile testing devices, including:

- **General device information**, encompassing identification parameters
- **Real-time** configuration and device status
- **Efficient recipe management**, facilitating the exchange of test conditions and instructions
- **Seamless result managemen**t, allowing the transfer of generated test results to MES and IT systems
- **Job management**, providing insights into ongoing tasks on the device and offering interactive capabilities
- **Key Performance Indicator** (KPI) tracking and statistical analysis
- **Comprehensive logbook** of pertinent machine changes
- **Robust maintenance support**, event tracking and notifications for user interactions and error handling on the testing device.

The OPC 40444 UA specification establishes a standardized foundation for enhancing the integration of textile testing devices into broader manufacturing and quality control processes, fostering efficiency, collaboration, and standardized data exchange across the textile industry.

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The specification is available free of charge from **umati.org/ua4ttd**

OPC 40451 UA for **Industrial Joining Technologies**

The **OPC 40451** for Industrial Joining Technologies is an initiative to create common OPC UA interface for joining technologies.

The VDMA Industrial Joining Technologies initiative, launched in May 2019, published Release 1 of the OPC 40451-1 Tightening Companion Specification in 2021, and Release 2 will be published in 2023. As a joint working group, the initiative is organized by VDMA Integrated Assembly Solutions and supported by the OPC Foundation.

The aim of the initiative is to create standard interfaces for joining technologies such as Tightening, Riveting, Gluing, Pressing etc. The first release of the initiative was to cover the specific Tightening use cases along with common elements at the joining level.

The core working group that is developing the specification consists of 15+ experts from 9 companies.

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The specification is available free of charge from **umati.org/ua4ijt**

The following are the use cases covered in Release 1, published in October 2021:

Asset Management
- Overview and identification of the asset

Result Management
- Standard definition of Result which is common for various joining technologies.
- Tightening Result containing Steps, Traces and Errors.
- Standard interface to access Results using Event, Methods, AddressSpace.

Basic Events
- Generic event with customized message and Result event with payload.

Upcoming Releases:
- Create a joining specification to harmonize various joining technologies.
- Cover additional use cases such as
  - Consolidated Result
  - Harmonization of Asset and Result models
  - Comprehensive Event Model
  - Joints
  - Future-proof information model
  - Program, Process, Parts
  - Integration of harmonized location model
  - Future-proof information model through use of flexible modeling approach with required semantics and rules.

The members of the initiative are:
- **Atlas Copco**
- **Cleco**
- **CSP**
- **Deprag**
- **Desoutter**
- **Rexroth**
- **SCS Concept Group**
- **Weber**
- **Xitaso**

OPC 40501 UA for **Machine Tools**

The **OPC 40501** series addresses use cases and parameters specifically for machine tools.

The aim is to create a common interface among machine tools of different technologies, manufacturers and model series.

The first part of the OPC UA Companion Specification for Machine Tools aims to provide the basics for such an interface. These allow for monitoring the machine tool and providing an overview of the jobs on it. Most of this information is not specific to a particular technology. The OPC UA for Machine Tools interface facilitates the exchange of information between a machine tool and software systems like MES, SCADA, ERP or data analytics systems.

The Machine Tool Specification was recently updated with Use Cases provided by OPC UA for Machinery, especially the Machine States Use Cases. They serve as the basis for further KPI Monitoring facets to enable calculations based on ISO 22400 KPI definitions.

umati provides resources on how to implement UA4MT uniformly at **umati.org/dev**

OPC 40501-1 and **VDMA 40501-1** was initiated by VDW, the German Machine Tool Builders' Association. It was created by a **Joint Working Group** between **VDW** and the **OPC Foundation**, comprising over 90 companies and almost 200 participants from all around the world.

Part 1 covers these use cases:

- Identify machines of **different manufacturers**
- Overview of whether **production is running**
- Overview of **parts** in a job
- Overview of **runtimes** for a job
- Overview of machine tool **state**
- Overview of upcoming **manual activities**
- Overview of **errors and warnings**
- Providing information for **KPI calculations**
- Providing an overview of **tool data**
- Providing OPC UA for Machinery **use cases**

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The specification is available free of charge from **umati.org/ua4mt**

OPC 40503 UA for **Metal Forming**

The **OPC 40503** series extends the technology-agnostic OPC UA for Machine Tools for Metal Forming-related use cases.

The aim of this specification series is to cover all metal forming machines and define all relevant process values for metal forming.

Part 1 of this specification contains various building blocks for metal forming that enable use cases to be formulated for different types of metal forming machines by taking building blocks from related companion specifications.

The specifications address the three main categories of metal forming: bulk forming, sheet forming, and powder forming and their underlying processes.

OPC 40503-1 development was initiated by Schuler Group, hosted and sponsored by the VDW, the German Machine Tool Builders' Association. It was created by a Joint Working Group between the VDW and the OPC Foundation, comprising the leading experts from companies and associations like:

- **Aida**
- **Amada**
- **AP&T Group**
- **Fanuc**
- **Japan Forming Machinery Association**
- **Komatsu**
- **Mitsubishi Electric**
- **Muratec**
- **Osterwalder**
- **Schuler Group**
- **SMS Group**
- **Trumpf**

Metal Forming			
Bulk Forming	**Sheet Forming**		**Powder Forming**
Forging	Deep Drawing	Shearing	Forging
Drawing	Blanking	Cutting	Drawing
Straightening	Punching	Stamping	
Sizing	Bending	Clinching & Pressing	
	Piercing	Pressing	

The Companion Specification covers the following **use cases**:

- Providing OPC UA for Machine Tools Use Cases - using the Machine Tools Facets
- Providing access to repetitive forming data and cyclic monitoring
- Providing access to characteristic forming positions and cyclic monitoring
- Providing information for metal forming tool-specific parameters
- Providing Process Values from functional working units related to the forming process
- Cyclic Monitoring of specific job parameters
- Cyclic Monitoring for forming part-specific information
- Notification if specific metal forming conditions appear during processing

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The specification is available free of charge from **umati.org/ua4mf**

OPC 40530 UA for **Laser Systems**

The **OPC 40530** series specifies an OPC UA Information Model for Laser Systems.

A laser system is considered a self-contained unit, including the laser source and all required subsystems, such as the control system for the laser source, optics, cooling aggregates and others. Hence, one or several laser systems may be a subcomponent of a larger machine. The goal of this companion specification is to provide a standardized and extendable interface for the integration of laser systems into an OPC UA environment.

This interface shall then provide laser system maintainers with easy and robust access to information, based on which they can optimize their individual processes and derive additional value. One example would be the enabling of fast and target-oriented maintenance measures or the on-demand stock part management of service life parts. This is primarily achieved by providing data regarding the laser system type, identity, and past and current states/conditions.

The Companion Specification development was initiated and funded by:

- **Coherent**
- **Laserline**
- **TRUMPF**

The document was created by a joint working group of the OPC Foundation and the VDMA, which involved 40 experts from North America, Asia, and Europe.

The following are the **use cases** covered in the Release Candidate published in June 2023:

- **Laser System Running or Not Running**
- **Errors and Warnings**
- **Information about the Next Maintenance**
- **Uniform Identification of Laser Systems**
- **Recipe Settings and Overview**
- **Activity Logging Information**
- **Condition Data Monitoring**
- **Consumption Data**

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The specification is available free of charge from **umati.org/ua4laser**

OPC 40540 UA for **Additive Manufacturing**

The **OPC 40540** series was developed to facilitate the exchange of information between AM machines and software systems such as MES, SCADA, ERP or data analysis systems.

The OPC 40540 for Additive Manufacturing is based on the OPC UA for Machine Tools interface and takes AM-specific features into account.

This allows additive manufacturing machines from different manufacturers to be efficiently integrated into existing and new production landscapes. The different AM technologies are taken into account in the specification and specific features such as just-in-time, on-site and high flexibility in production networks are thus supported. The spread and successful use of additive manufacturing in industry is promoted in this way. The specification covers a similar spectrum of use cases to those of OPC 40501 for machine tools. Other AM-specific parameters such as job and component properties, material and consumable properties, and the material cycle are made available at the systems' interfaces.

OPC 40540 and VDMA 40540 were initiated by a sub-working group of the VDMA Additive Manufacturing Working Group with about 200 participating companies. The first version of UA4AM initially only deals with the interfaces of the printing systems. The VDMA Additive Manufacturing working group covers the entire process chain, thus also generating potential for corresponding expansion of the Specification.

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The specification is available free of charge from **umati.org/ua4am**

OPC 40701 UA for **Surface Technology**

The **OPC 40701** is an initiative to create common OPC UA interfaces for surface technology machinery.

The aim of the initiative is to create common OPC UA interfaces for surface technology machinery such as

- **paint application technology**
- **shot blasting technology**
- **plasma surface treatment technology**
- **cleaning and pretreatment technology**

Current activities focus on the interface of material supply systems for coating material. The use-cases considered cover the provision of raw data of

- **all quality-relevant parameters with time stamp to higher-level systems**
- **all process-relevant parameters with time stamp to other components/machines**

The information model aims to provide the basis for detailed monitoring of the material supply system and its components. The model defines parameters for all relevant system components including pumps, tanks, valves, pipelines, filters and measuring devices for monitoring physical quantities such as temperature, pressure, flow, etc.

On the basis of the information model developed for material supply systems, the OPC UA surface technology community teamed up with umati for demonstration of a complete paint application plant consisting of

- **pretreatment plant**
- **material supply system**
- **dosing system**
- **application system**
- **conveyor**
- **spray booth**
- **dryer**

The paint application plant model has been developed jointly by the **companies**

- **AFOTEK Anlagen für Oberflächentechnik GmbH**
- **b+m surface systems GmbH**
- **Dürr Systems AG**
- **J. Wagner GmbH**
- **Konzeptpark GmbH**
- **WIWA Wilhelm Wagner GmbH & Co. KG**

The umati implementation is a prototype tested in parallel to the development of the information model by the community. The umati demonstrator infrastructure is used to display the current state of work.

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The specification is available free of charge from **umati.org/ua4st**

user group **Automotive**

VDMA has launched the Automotive user group to promote the use of OPC UA and Companion Specifications in the automotive industry and to identify the needs of the sector. The user group brings together leading companies from the automotive industry as well as organizations from the field of interoperability.

To promote and harmonize the use of OPC UA and OPC UA Companion Specifications in the automotive industry, VDMA has established the Automotive user group. This provides a platform for exchange between leading companies from the automotive industry as well as with important organizations from the field of interoperability. The Automotive user group aims to identify and communicate the needs and requirements of the automotive industry for OPC UA and Companion Specifications.

The automotive industry differs from the machinery and equipment industry in its size and level of automation. While the mechanical and plant engineering sector includes many small and medium-sized companies that often offer individual solutions, **the automotive sector includes very large companies that already have highly automated processes. This poses particular challenges for communication between machines and systems and for the integration of new technologies.**

The purpose of the panel is a regular exchange between the participating companies about their experiences with OPC UA and OPC UA Companion Specifications in practice. Possible problems or suggestions for improvement are also to be discussed. This is complemented by the presentation of the latest results of standardization and harmonization in the context of OPC UA for Machinery as well as the announcement of projects such as the development of guides or planning of relevant events.

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user group **Software Vendors and OPC UA**

OPC UA is used to aggregate and use operational data across the shopfloor. An exchange on the use of OPC UA is taking place through the user group of software vendors.

OPC UA and OPC UA CS are increasingly becoming the communication standard in the field of discrete and continuous manufacturing. Step by step, the architecture is spreading to products from a wide range of industries. While the development and implementation is very stringent from the point of view of the machine manufacturers, various questions still arise from the point of view of the software manufacturers:

- Which **use cases and business models** arise from the use of OPC UA and the OPC UA CS?
- Which **Companion Specification** is relevant for which software?
- Are there already **best practices**?
- Which **SDK's** are specialized for which applications?
- Can an implementation be **certified**?
- From which **project size** is a change worthwhile?

In order to address these and other questions, the Software Vendors and OPC UA umati user group was established. It addresses companies that are planning a software implementation aimed at importing data from production via OPC UA, as well as companies that have already implemented such solutions and are looking for suggestions on how to develop them. In addition, companies that offer software tools for implementation are part of the target group of users.

The purpose of the committee is to provide a forum for a regular exchange of experience between companies. It will gather the requirements for OPC UA, Companion Specifications and tools for OPC UA. Not only trailblazers but also newcomers can present their approaches and benefit from the exchange with the other players.

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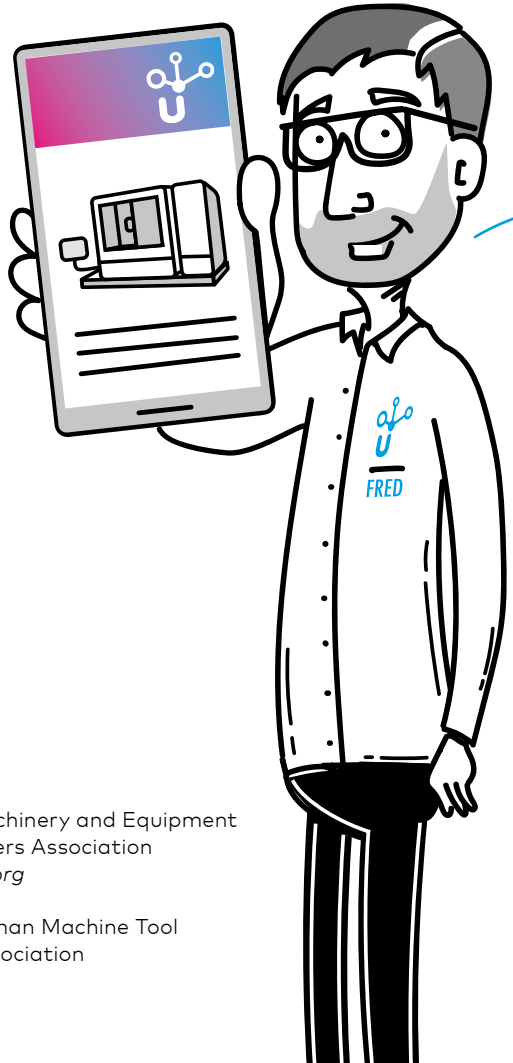

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