VDMA supports developing OPC UA CS

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The VDMA

Relationship between VDMA and OPC Foundation

Overview about some VDMA OPC UA activities
The VDMA

» Most important industrial association in Europe.

» The VDMA represents over 3,200 member companies in the engineering industry

» The VDMA is structured in
  – 38 trade associations,
  – 6 regional subsidiaries,
  – Berlin, Brussels and foreign subsidiaries (Brazil, China, India, Japan, Russia, Austria)
  – Working groups and forums,
  – Departments and competence centers and
  – Companies and foundations.

The VDMA represents the broad machine building / manufacturing industry.
VDMA represents the broad manufacturing industry
The trade associations and sector groups

» Agricultural Machinery
» Air Conditioning and Ventilation
» Air Pollution Control
» Air-handling Technology
» Building Control and Management
» Cleaning Systems
» Compressors, Compressed Air and Vacuum Technology
» Construction Equipment and Building Material Machines
» Drying Technology
» Electrical Automation
» Electronics, Micro and Nano Technologies
» Engine Systems for Power and Heat Generation
» Engines and Systems

» Fire Fighting Equipment
» Fluid Power
» Food Processing Machinery and Packaging Machinery
» Foundry Machinery
» Gas Welding
» Hydro Power
» Integrated Assembly Solutions
» Large Industrial Plant Manufacturing
» Lifts and Escalators
» Machine Tools and Manufacturing Systems
» Machine Vision
» Materials Handling and Intralogistics
» Measuring and Testing Technology

» Metallurgical Plants and Rolling Mills
» Metallurgy
» Micro Technologies
» Mining
» Plastics and Rubber Machinery
» Power Systems
» Power Transmission Engineering
» Precision Tools
» Printing and Paper Technology
» Process Plant and Equipment
» Productronic
» Pumps + Systems
» Refrigeration and Heat Pump Technology
» Robotics

» Robotics + Automation
» Security Systems
» Software
» Surface Treatment Technology
» Textile Care, Fabric and Leather Technology
» Textile Machinery
» Thermal Turbines and Power Plants
» Thermo Process Technology
» Valves
» Waste Treatment and Recycling
» Wind Energy
» Woodworking Machinery
Why manufacturers favor OPC UA

Goal
» Integration of components, machines and plants
» Interoperability in the factory

Need
» Replacing manuals and data sheets by information models
» Standardized information about components and machines vendor-independently

Benefit
» Reduces integration efforts
» Saves money and time
» Enables new business models
The VDMA

Relationship between VDMA and OPC Foundation

Overview about some VDMA OPC UA activities
Delimitation between VDMA and OPC Foundation

- Communication layer → Basic Specification/
  - How to transmit?

- Information layer → Companion Specification/
  - What to transmit?

- Vendor Specific Extensions
  - Companion Information Models
    - VDMA
  - Built-in Information Models
  - OPC UA Meta Model
    - OPC Foundation
Cooperation between VDMA and OPC Foundation

VDMA → What!

hosts

OPC Foundation → How!

accepts

defines

OPC UA

Defines semantics

OPC UA Robotics

OPC UA Weight Tech.

Branch XX

Companion Specification

Companion Specification

uses
The VDMA is Doing International Standards – get informed, participate in and use them

- VDMA Brazil
- VDMA European Office
- VDMA Germany
- VDMA India
- VDMA China
- VDMA Japan
- VDMA Russia
The VDMA

Relationship between VDMA and OPC Foundation

Overview about some VDMA OPC UA activities
OPC UA as an holistic approach inside the VDMA

VDMA

Working Groups
- Coordination
- Quality assurance
- Coherence assurance

Education Programm for employees
- Basic OPC UA training
- Training process OPC UA CS
- Education videos

Publications
- OPC UA CS for Industry (Typ A CS)
- Specification 40000 „How to write an OPC UA CS“

External Topics

Member support
- Information material
- Fairs
- Presentations
- Events
- Demonstrators

Industry advisory council
- Industry representatives
- Identification of needs
- Influences the OPC UA activities

External Committees and Coordination
Video on opcua.vdma.org
New OPC UA VDMA Homepage:

opcua.vdma.org

Provides information on

- New OPC UA Activities
- OPC UA CS Working groups
- Companion Specifications Download
VDMA represents the broad manufacturer industry
VDMA has more than 3200 member companies

- Agricultural Machinery
- Fire Fighting Equipment
- Metallurgical Plants and Rolling Mills
- Security Systems
- Air Conditioning and Ventilation
- Fluid Power
- Metallurgy
- Software and Digitization
- Air Pollution Control
- Food Processing Machinery and Packaging Machinery
- Micro Technologies
- Surface Treatment Technology
- Air-handling Technology
- Foundry Machinery
- Mining
- Textile Care, Fabric and Leather Technology
- Building Control and Management
- Gas Welding
- Power Systems
- Textile Machinery
- Cleaning Systems
- Hydro Technology
- Power Transmission Engineering
- Thermal Turbines and Power Plants
- Compressors, Compressed Air and Vacuum Technology
- Integrated Assembly Solutions
- Precision Tools
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- Construction Equipment and Building Material Machines
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- Materials Handling and Intralogistics
- Robotics
- Wind Energy
- Engines and Systems
- Measuring and Testing Technology
- Robotics + Automation
- Water Energy
# Plastics and Rubber Machinery

<table>
<thead>
<tr>
<th>Status</th>
<th>Description</th>
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<tbody>
<tr>
<td>Finished</td>
<td><strong>EUROMAP 83</strong>: Basis of all other EUROMAP OPC UA CS</td>
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<tr>
<td></td>
<td>» General Type definitions</td>
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<tr>
<td></td>
<td><strong>EUROMAP 77</strong>:</td>
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<tr>
<td></td>
<td>» Injection moulding machines and central computers/MES</td>
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<tr>
<td>Release Candidate</td>
<td><strong>EUROMAP 82.1</strong>:</td>
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<tr>
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<td>» Injection moulding machines and temperature control devices</td>
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<tr>
<td>Under Development</td>
<td><strong>EUROMAP 79</strong>:</td>
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<tr>
<td></td>
<td>» Injection moulding machines and robots</td>
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<tr>
<td></td>
<td><strong>EUROMAP 84</strong>:</td>
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<td>» Extruders and MES</td>
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<td>Planned</td>
<td><strong>EUROMAP 82.x</strong>:</td>
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<td>» Interface between injection moulding machines and other peripheral devices</td>
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<tr>
<td></td>
<td><strong>EUROMAP 85</strong>:</td>
</tr>
<tr>
<td></td>
<td>» Blow moulding machines and MES</td>
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EUROMAP 77 working group
– developed from the industry for the industry

Injection moulding machine manufacturers:
- ARBURG GmbH + Co KG
- ENGEL AUSTRIA GmbH
- FANUC Germany/EUROPE
- Ferromatik Milacron GmbH
- KraussMaffei Technologies GmbH
- NEGRI BOSSI S.p.a.
- Netstal-Maschinen AG
- Sumitomo (SHI) Demag Plastics Machinery GmbH
- Wittmann Battenfeld GmbH

Controller manufacturers:
- B&R Industrial Automation GmbH
- Beckhoff Automation GmbH & Co. KG

MES suppliers:
- ARBURG GmbH + Co KG
- bfa solutions ltd
- BMS bvba
- INCLUDIS GmbH
- inray Industriesoftware GmbH
- MPDV Mikrolab GmbH
- ProSeS BDE
- RJG Germany
- Steinberger Software
- Stöckeler Software Services e.U.
- TIG – Technische Informationssysteme Ges.m.b.H.

User:
- LEGO Systems A/S
Nesting of OPC UA Companion Specifications

OPC UA CS EUROMAP 83

OPC UA CS EUROMAP 77
Nesting of OPC UA Companion Specifications

OPC UA CS EUROMAP 83

OPC UA CS EUROMAP 77
OPC UA CS for machine tools and manufacturing systems

Scope

» Development of an OPC UA information model for the communication machine tools and manufacturing systems
» Communication between machine tools and the higher-level systems on or outside of the shopfloor
» Universal, manufacturer-independent interface based on OPC UA
» Manufacturer specific extensions foreseen

Use Case

» Basic description of the machine tools
» Status/OEE monitoring, job and next interaction vertically into higher level manufacturing systems (MES, etc.)
» Further use cases like tool management, automation system interaction, order management foreseen

Draft specification in preparation, based on VDW working group

JWG Kick Off December 2018/January 2019
OPC UA CS for machine tools and manufacturing systems

umati is an initiative of VDW, the German Machine Tool Builders’ Association

umati was created in the belief that

- exploiting data creates an added value for customers, thus leading to new, trendsetting business models for the sector
- open interfaces are the basic requirement to exchange data between machines and IT systems
- the specification of open interfaces must be undertaken by the machine tool industry itself, to cover the specific needs of its customers
- this is no field for competition, neither results it in any advantage in the market, but requires collaboration to use resources more efficiently

Up to now...

10 machine tools manufacturers joined to create the standard
5 controller suppliers support implementation and realization
1 research institute supports the activities

➔ The initiative is open for interested participants from all over the world!
VDMA OPC Vision Initiative

Joint working group of

Core Working Group of 10 companies

Total Working Group of approx. 60 stakeholder companies

Core Working Group kick-off 03/2017

19 days of face-to-face meetings and several online meetings
„The camera is not working!“
A vision system is not a camera

**Physical quantities**
- (e.g. visible light, IR, X-Rays, …)

**Camera**
- **Electrical signals**
  - (analog / digital, wired / wireless)

**Vision system**
- **Information**
  - (e.g. measurements, codes, characters, poses, …)
A wonderful range of mind

Broad system range
- Vastly different system types
- Wide variations in performance and flexibility

Enormous application variety
- Different configurations
- Different results
- Different time behavior
- …
OPC UA Vision, part 1 focus on functionality

Machine vision system data very hard to generalize → initial focus on:

1. Standardized data management model, not content
2. Standardized behaviour model to control and observe
VDMA OPC Vision Initiative
Standardized top level state machine

We want to achieve
• Common behavior for all standard compliant systems for
  • Startup,
  • Shutdown,
  • Error handling,
  • Automatic in-line operation
• Extensibility for future standard or vendor-specific modes of operation

Top level VisionStateMachineType is mandatory!
The VDMA OPC Robotics Initiative

Some characteristics

» Kick-off in February 2017
» approximately 35 companies in the total working group
» members of the core working group are vendors and users
» organized as a joint working group by
» 9 face-to-face two-days core working group meetings, clarifications and preparations in sub groups in between and several online conferences

Proud to present at the automatica 2018

» OPC UA Robotics, part 1 (Draft)
» fair demonstrator with 8 vendors providing data by one information model
Definition of Robotics for the Companion Specification

The OPC UA Robotics CS describes an information model which aims to cover all current and future robotic systems

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

A so called motion device system can consist of several manipulators and controls

- a robot on a linear unit working with two turntables controlled by one control unit
- a mobile platform with to robot arms
Component-oriented modelling approach

1 MotionDeviceSystem includes:

» 1…n MotionDevices (kinematics)
  – 1…n Axis

» 1…n Controller (control units)
  – 1….n Software
  – 0…n TaskControls

» 1…n SafetyStates
Agreement to proceed stepwise

OPC UA Robotics, part 1
» Asset management
» Condition monitoring
» Preventive Maintenance
» Vertical integration for
  – higher-level controls,
  – SCADA systems,
  – MES and
  – cloud

OPC UA Robotics, subsequent parts:
• methods and state machine(s) to initiate actions at the robotic system
• alarms and events for messaging and conditions
• possibility to store customer specific information inside the server e.g. ERP data, cost center
Robotics condition monitoring dashboard demonstrates vendor-independence

Access any of your robots, of any robot brand, at any time, anywhere in the world!
Impressions VDMA OPC UA Demonstrator booth at automatica 2018 trade show
Conclusion

VDMA and OPC Foundation work closely together

More than 50% of the industries represented by VDMA have at least an awareness of OPC UA

Rising demand of OPC UA activities show that the ongoing activities in VDMA are the tip of the iceberg

Standards developed by the industry should be used internationally
Thank you for your attention!

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