AutomationML for automation components

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Specialist System Architecture
Machine architecture

Classical control architecture
Machine architecture

Classical control architecture
Object and capability based machine architecture

Digital representation

- Attributes = data/information model
- Methods = Capabilities

„Digital representation“ or „digital represented object“
Object and capability based machine architecture

Digital representation as architectural element

Realised with OPC UA
New machine architectures on the basis of digital representations for engineering and operation
Digital representation – during Engineering and operation

- Herstellerkataloge
- Auslegungstools
- ECAD
- MCAD
- Programmiertools
- Principiellösung
- Deployment
- "Strom an..."
- Instanzierte Maschinenarchitektur
- Fileformat
- Parametrierung Konfiguration
- IBN
- Optimierung
- Betrieb
- Wartung
- Entsorgung

engineering
betrieb
Digital representation – during Engineering and operation
Capability based engineering
Capability based engineering

1 Produkt

2 Montage-Vorranggraph

3 Fähigkeitenauswahl (1. Näherung)

4 Fähigkeitenauswahl (Ausdetaillierung)

5 Matching mit konkreten Komponenten und deren Fähigkeiten
Capability based engineering

Realised with CODESYS

1. Generic solution
2. Virtual comissioning of generic solution
3. Exchange with real products
4. Virtual comissioning of real comissioning
Capability based engineering

Manufacturer independent categorisation of mechatronic capabilities

- Rotative Movement
- Linear Movement
- Gripping
- Clamping

Standardisation

VDI 2860
Montage und Handhabung

DIN 8580
Fertigungsverfahren

taxonomische Hierarchisierung zur funktionalen Kategorisierung von Automatisierungselementen
Physical digital representation of automation components
Physical digital representation

Mechatronic object oriented systems

Abb.: EMC2xx gefaltet

Abb.: Abmessungen

Stapel

Z-Form

U-Form

Flach

Abb.: Flexibler Einbau durch Faltung

Abb.: Flexibler Einbau durch Faltung

Sensorik

Ventile

Elektronik / CPU

Software

El. Energie

Netzwerk

Druckluft
Physical digital representation

Example logistic module (stopper) machine builder ASYS
Physical digital representation

Economical analysis
VDMA OPC UA Demonstrator
VDMA OPC UA Demonstrator

- All devices of all manufacturers described in AutomationML
- All devices offer standardised capabilities
- Capability based control software:
- All devices present with OPC UA in the system (data & control)
VDMA OPC UA Demonstrator

Hersteller

Maschinenbauer

Software/Kommunikation/Sicherheit

Steuerungshersteller
Vielen Dank für Ihre Aufmerksamkeit!

OPC UA Demonstrator
Pains in Engineering

Excel
MCAD
Emails
ECAD
Sketch

Handbook

Task

Realisation

e.g. Programmer

OPC UA Demonstrator
Digital Representation for Engineering – state of the art

Festo solenoid valve VUVG-BK10-M52-AT-F-1R8L-S

Data (excerpt)
Digital Representation for Engineering – future?
Filling Toolchain Gaps with AutomationML
AutomationML: Architecture und Content

CAEX IEC 62444
Top level format

- Plant topology information
- Plants
- Cells
- Components
- Attributes
- Interfaces
- Relations
- References

OBJECT A

OBJECT A1

OBJECT A2

OBJECT A3

Celldata
Geometry
Kinematics

PLCopen XML
Behaviour
Sequencing

Further XML-
Standard format
Further aspects of engineering information

AutomationML standardizes how CAEX objects reference external documents, in order to model the geometry, kinematics, or detailed topology of an object as well as references to further documents.
AutomationML Example of Use: Geometry und Kinematics

<AutomationML/>

COLLADA™
AutomationML Example of Use: Correctly Configured and Open Engineering Data

Exchange of PLC configuration between ECAD and PLC-Tool

Correctly configured!
AutomationML Example of Use: Synthesis of PLC Code
AutomationML e.V. cooperates with CADENAS
Thank You!