

The Partner For Success

ZUKEN[®]

Enabling the Digital Twin for Mechatronic Systems with Electrified Component Data

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Managing Director Zuken E3 GmbH, Ulm



40 years of success and innovation in electronic and electrical engineering

ZUKEN®

Founded	1976
Revenue Year ended March 2018	23 582 000 JPY / ~185M EUR
Corporate Headquarters	Yokohama, Japan
European Headquarters	Munich, Germany
North American Headquarters	Westford, Massachusetts
Stock Listing	Tokyo Stock Exchange Level-1
Employees	1,200
Operational Excellence	Profitable, no debt



Zuken Inc.
Worldwide Headquarters
Yokohama, Japan



Zuken GmbH
European Headquarters
Munich, Germany



Zuken USA Inc.
North American
Headquarters
Westford, Massachusetts

Zuken is an engineering-driven organization focused on customer value



Six Development Centers

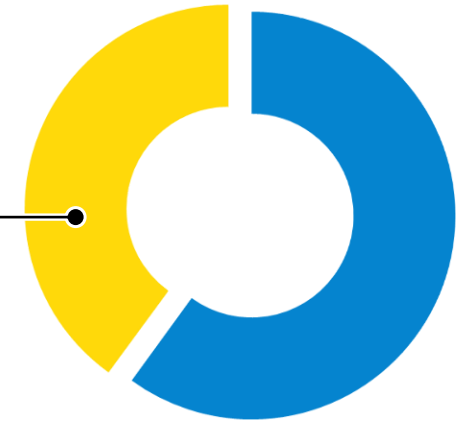
R&D Headquarters	Yokohama, Japan
SI and EMC	Paderborn, Germany
Electrical and Fluid	Ulm, Germany
Automotive and Transportation	Erlangen, Germany
PCB and Routing	Bristol, United Kingdom
Advanced Packaging	San Jose, California, USA

Development and Support Engineers

Worldwide Staffing	500
Average Tenure	> 10 years

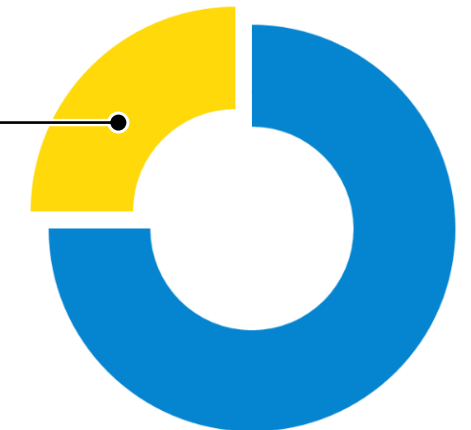
Engineering
Resources

40%



R&D
Investment

25%



What we do

Markets and industries



We provide software and services
for electronic and electrical product development



Industrial Machinery



Consumer Electronics



Power



Life Sciences



Automotive / Special Vehicles



Railway



Aerospace



Military / Defense

Enabling the Digital Twin for mechatronic systems with electrified component data

- Cable harness, control cabinet and fluid development based on mechanical and electrical information
- Complete digital information for production, documentation and commissioning
- Production-oriented development without prototype construction
- (Component-) Data are the foundation
- Introduction of the E3 component Cloud

Industry trends

- In the Automotive industry
 - CASE: Connected, Autonomous, Shared/Service, Electric



Changing from “Car manufacturer” to “Mobility service company”

Industry trends

- In the Machinery industry
 - IoT, Industry 4.0, Smart Factory

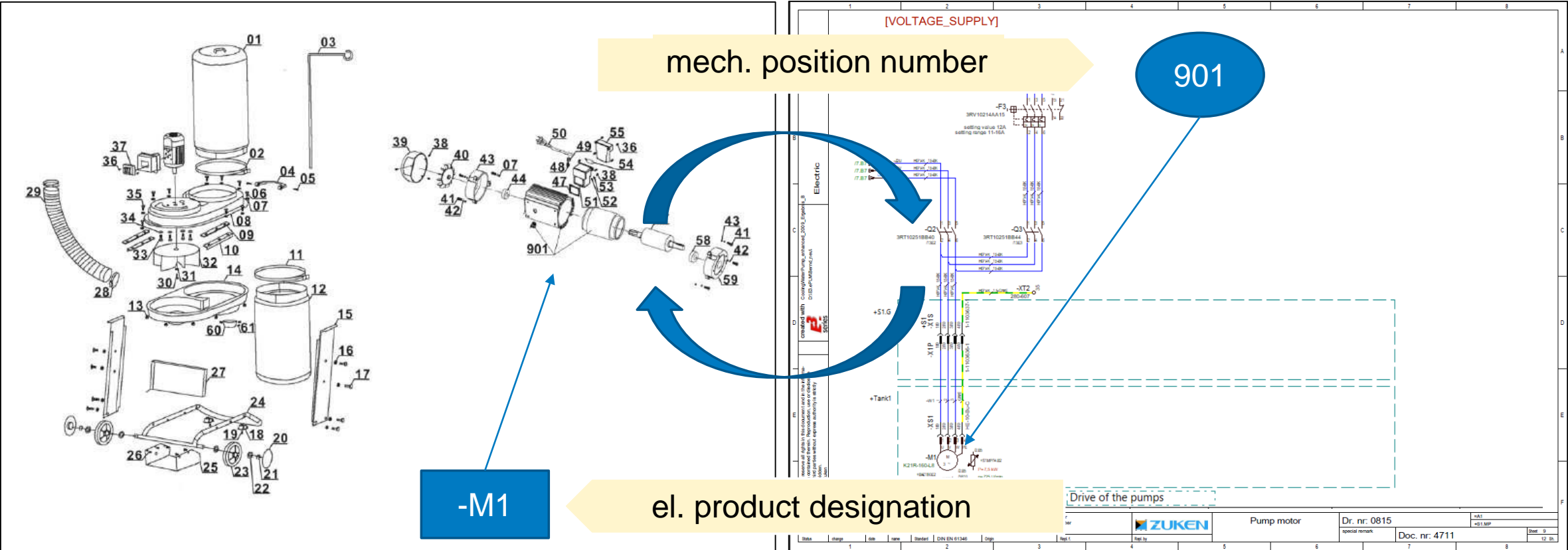


Factory which autonomously perform optimal production = CASE

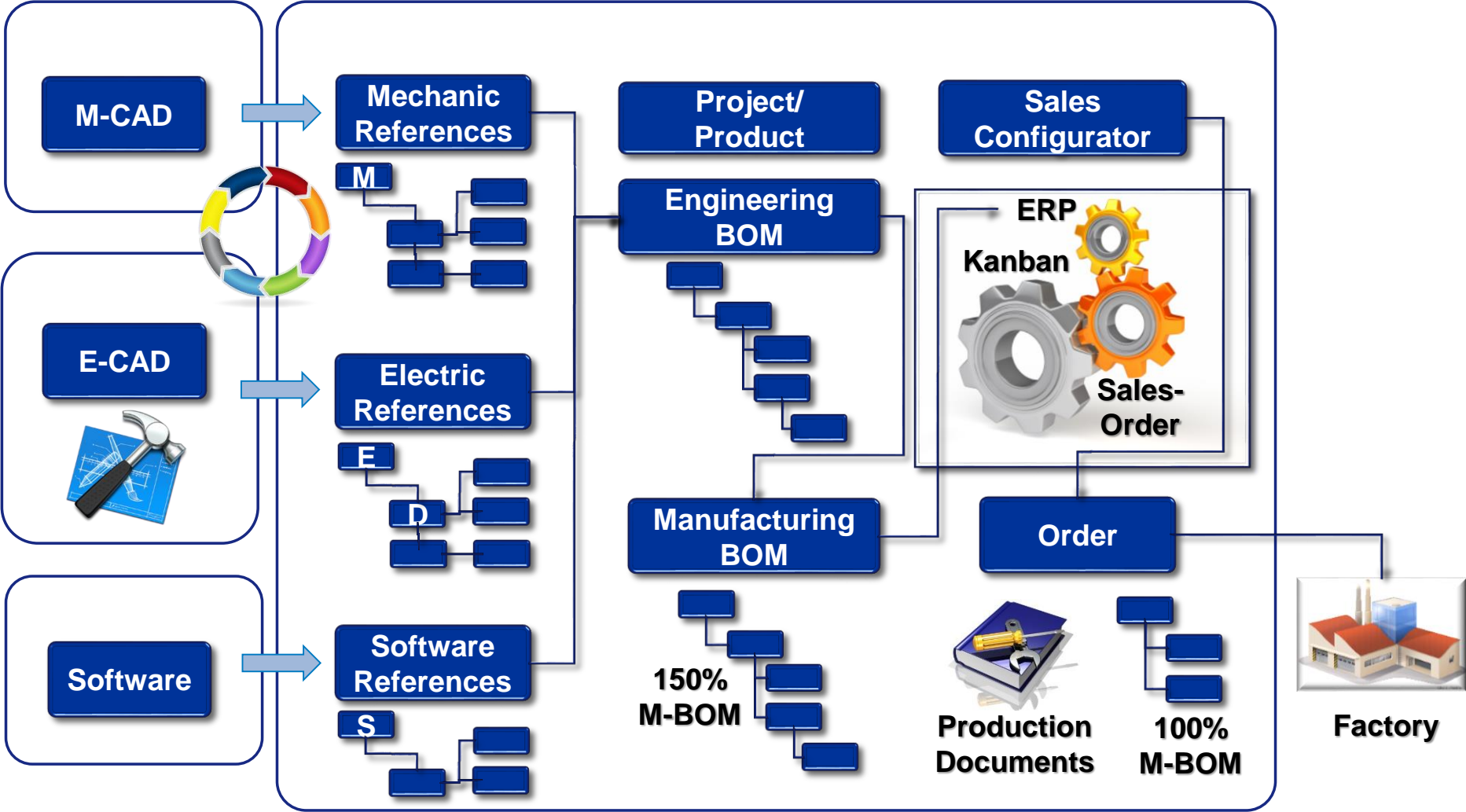
Industry trend: Digitalization



Creates new values and business opportunities



Mechatronic System Design Process

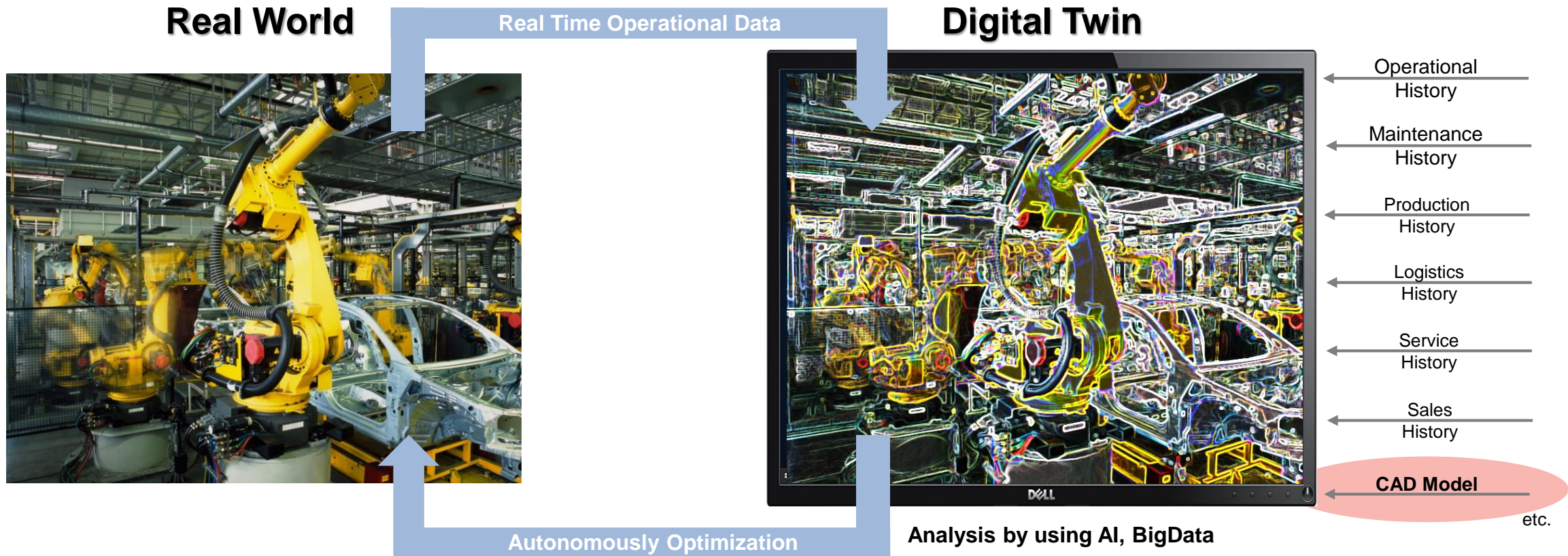


eBOM/mBOM

Mechatronic System Design

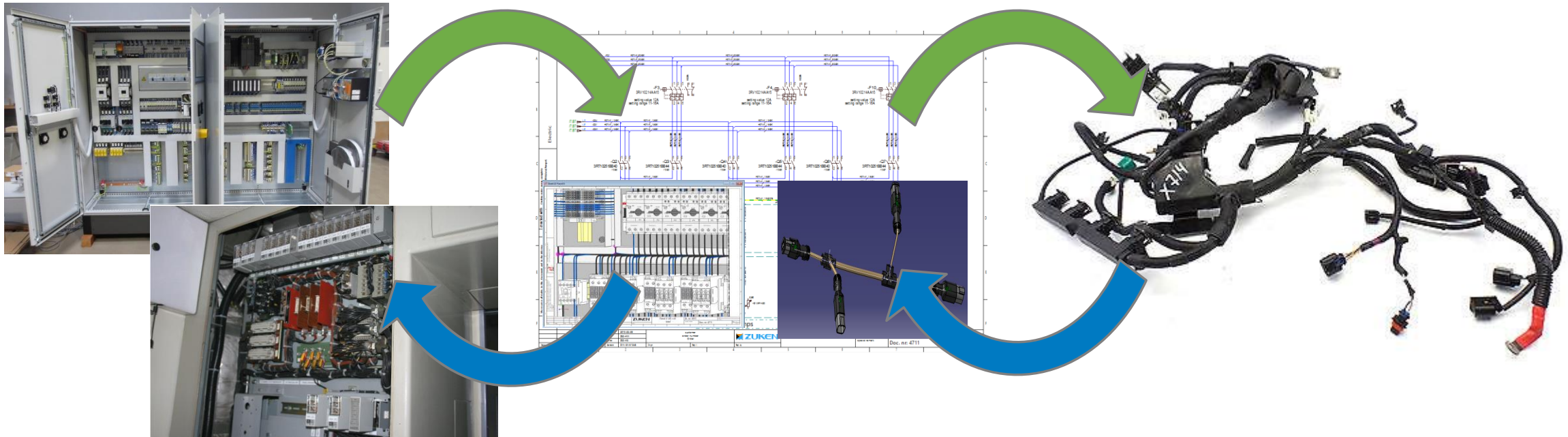
To realize “Business Digitalization”

- Systems & Wiring design information have to be digitalized as part of “Digital Twin”



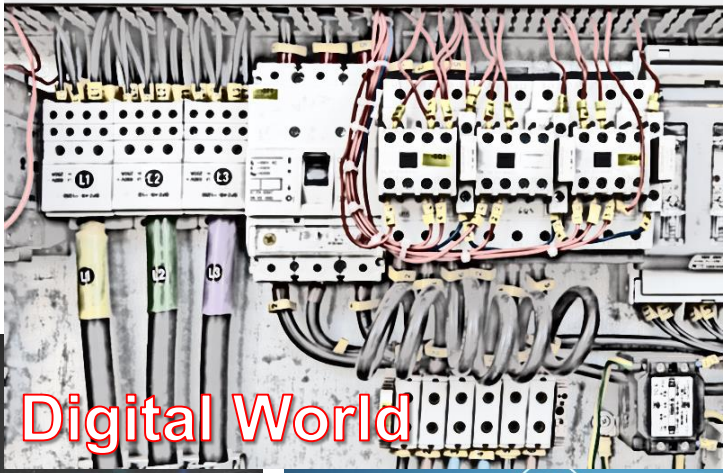
Mechatronic System Design

- Regarding the entire product development process there are two main things to keep in mind when working with both E-CAD and M-CAD. They are the...
 - Installation of panels and mounting plates
 - Wiring and cable harness creation



Digital Twin in Electrical Engineering

- Control cabinet development based on mechanical and electrical information



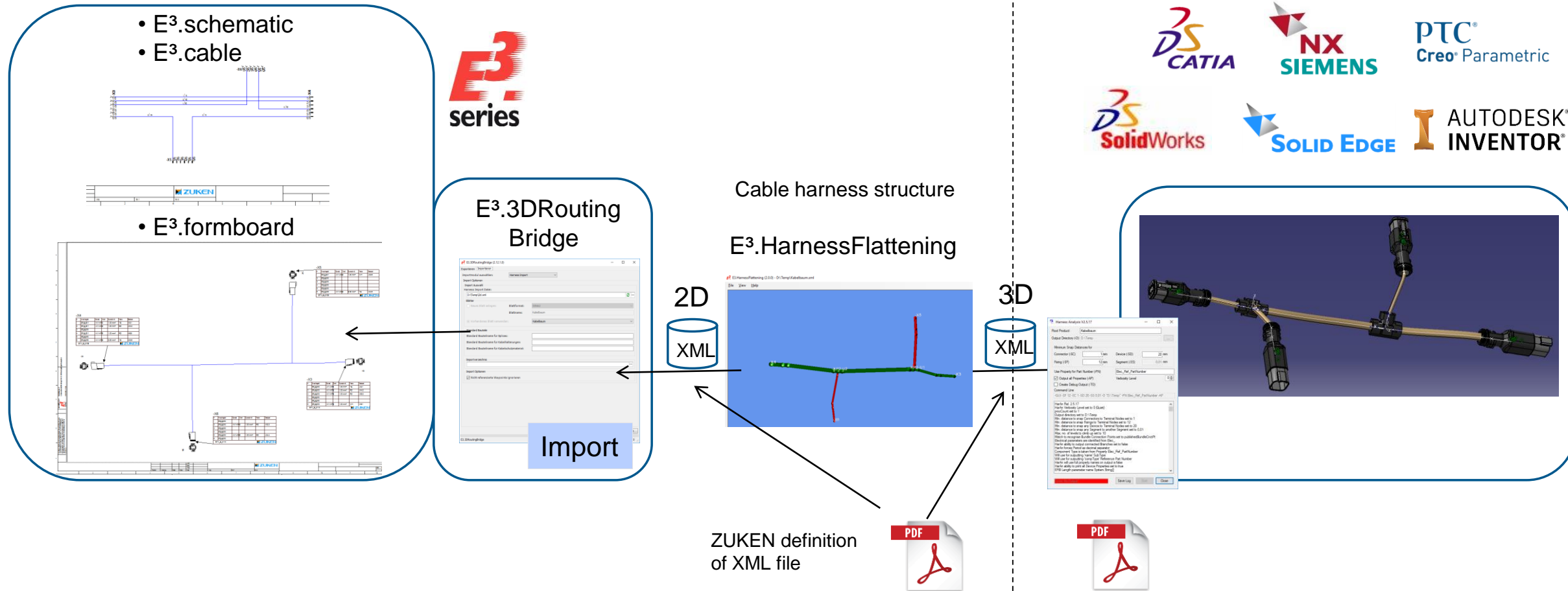
Accurate & efficient dev.



Harness design process with E³.formboard



- Example

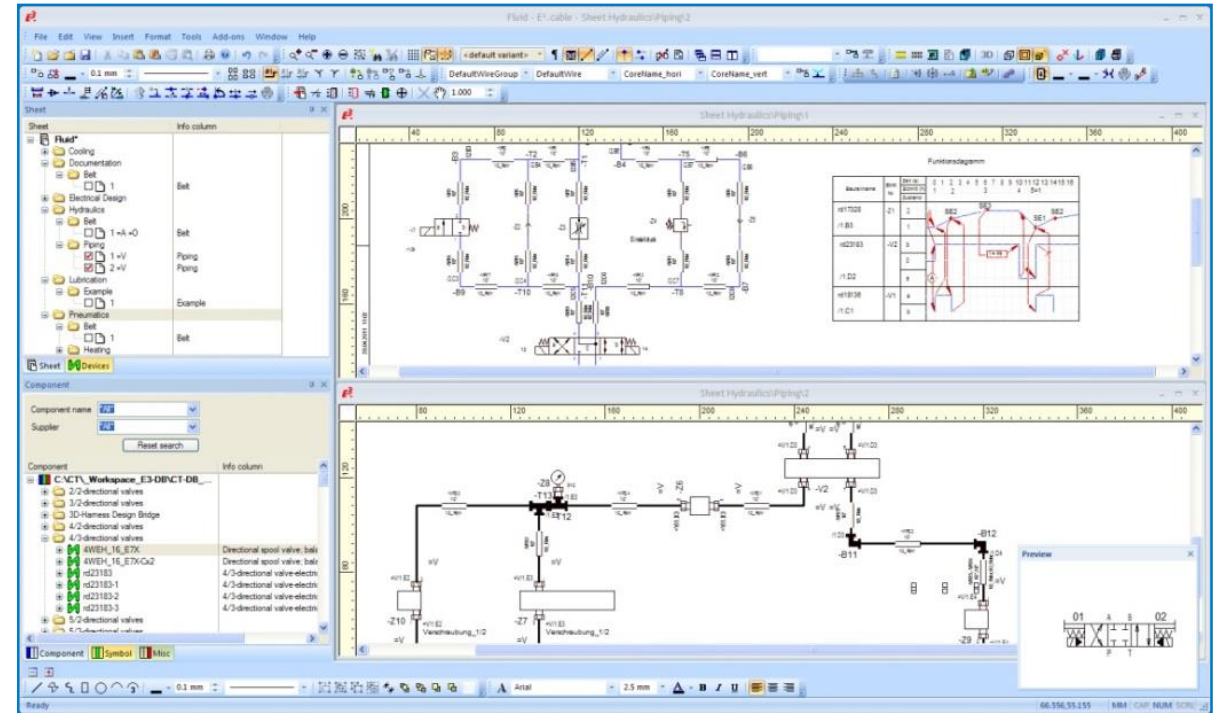


Fluid Design with E³.fluid



- E³.fluid
 - For hydraulics, pneumatics, lubrication and cooling
 - Complete solution easy to use

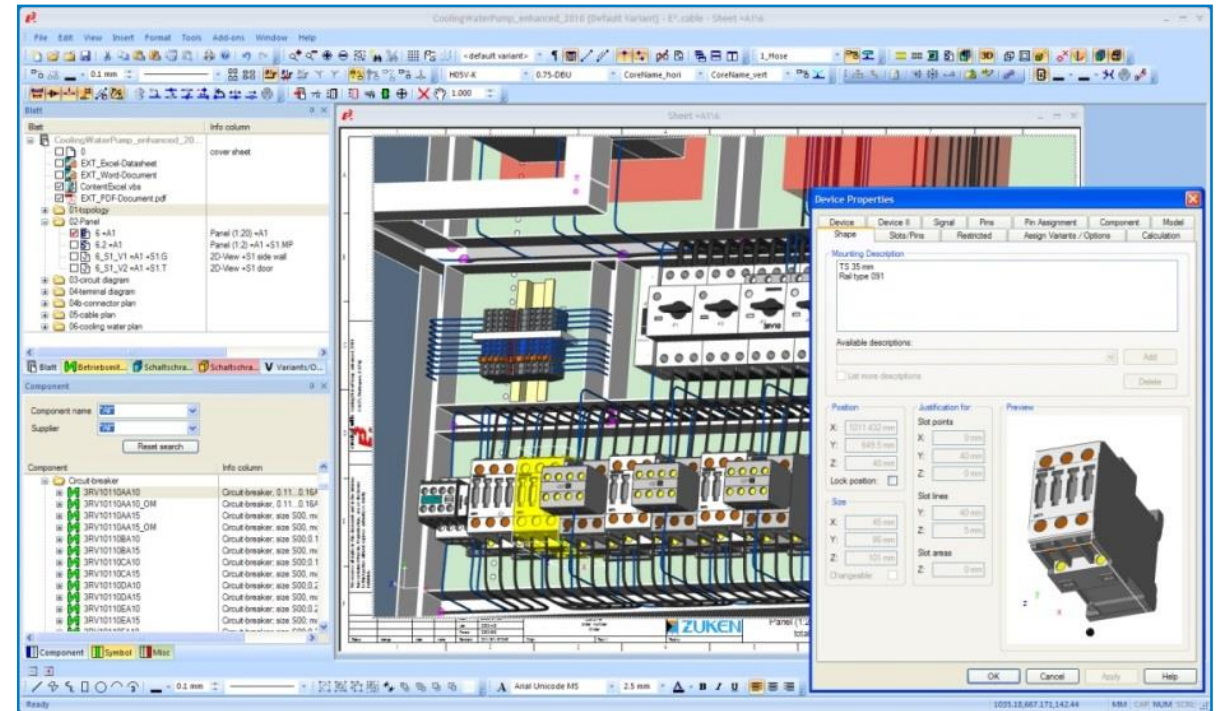
- Complete documentation
 - Fluid plan
 - Specific reports
 - Production documentation
 - Customer documentation
 - Manufacturing and service



Cabinet Layout with E³.panel



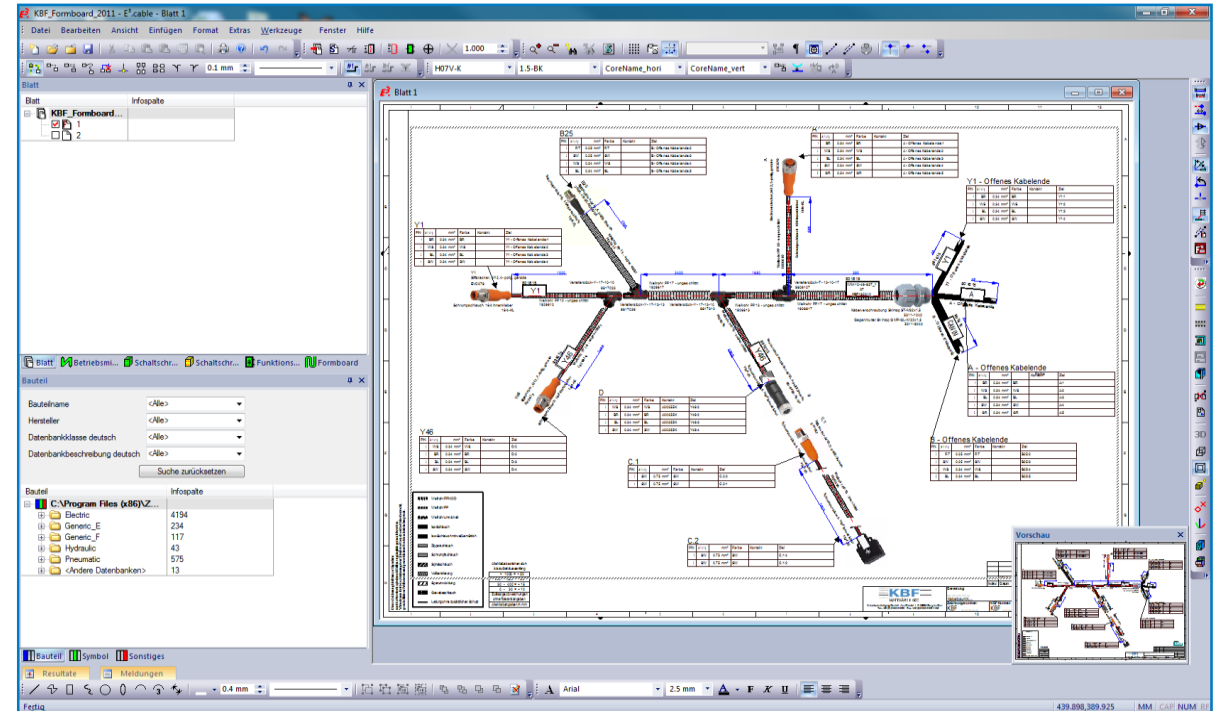
- E³.panel
 - For Cabinet layout and wiring
 - Complete solution easy to use
- Layout module for E³.schematic and E³.cable
 - 2D / 3D cabinet layout
 - Automatic routing
 - Manufacturing integration
 - Labeling
 - Strip- cut- and mark machines
 - Drilling and milling
 - Specific reports



Nailboard Drawings with E³.formboard

- E³.formboard
 - For scaled nailboard drawings
 - Complete solution easy to use

- Layout module for E³.cable
 - Specific sheet layouts
 - Automatic functions
 - Manufacturing integration
 - Labeling
 - Strip- cut- and mark machines



E³.series – The Electrical Engineering System for all Industries

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Automotive



Motorcycle



Agriculture machinery



Construction machinery



Aerospace



Rolling stock



Boats and ships



OA machinery



FA machinery



Production facility



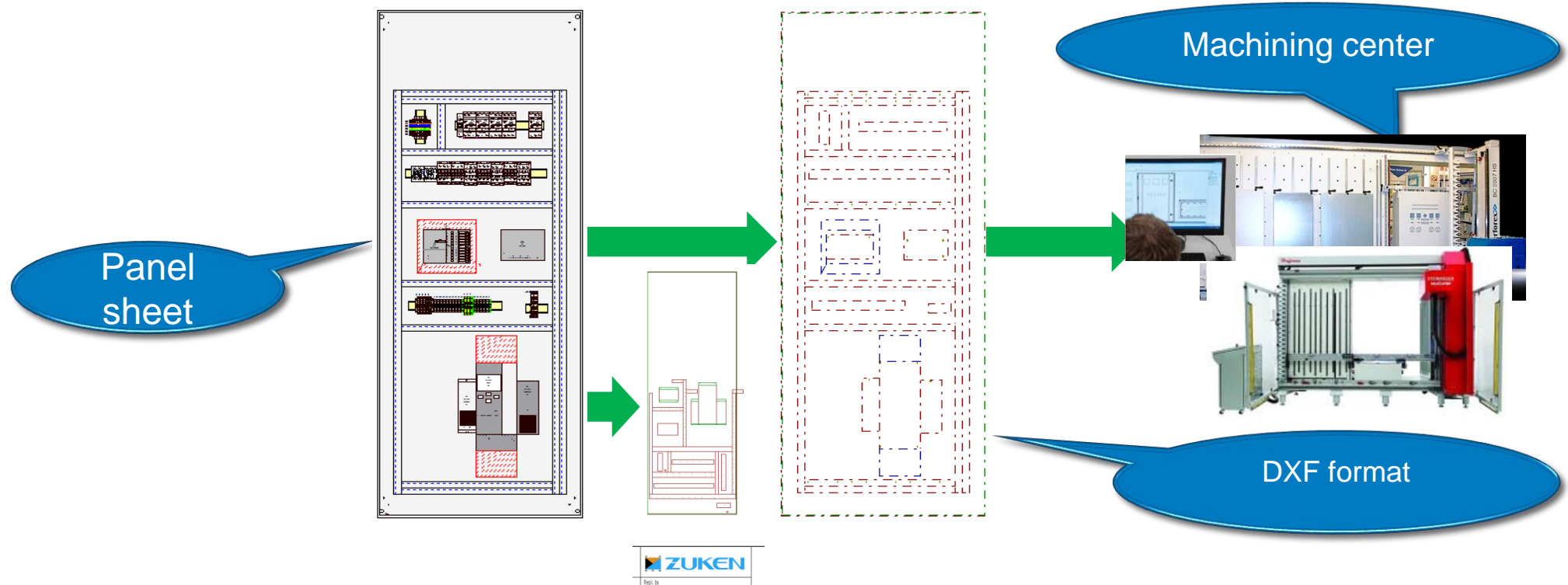
Industrial plant



**Others
(Electrical equipment)**



- Tool for exporting templates with drill holes and cutouts in DXF format from E³.panel
 - DXF format can be imported by numerous machining centers for further processing
 - Can be displayed in E³.series





Digital Manufacturing

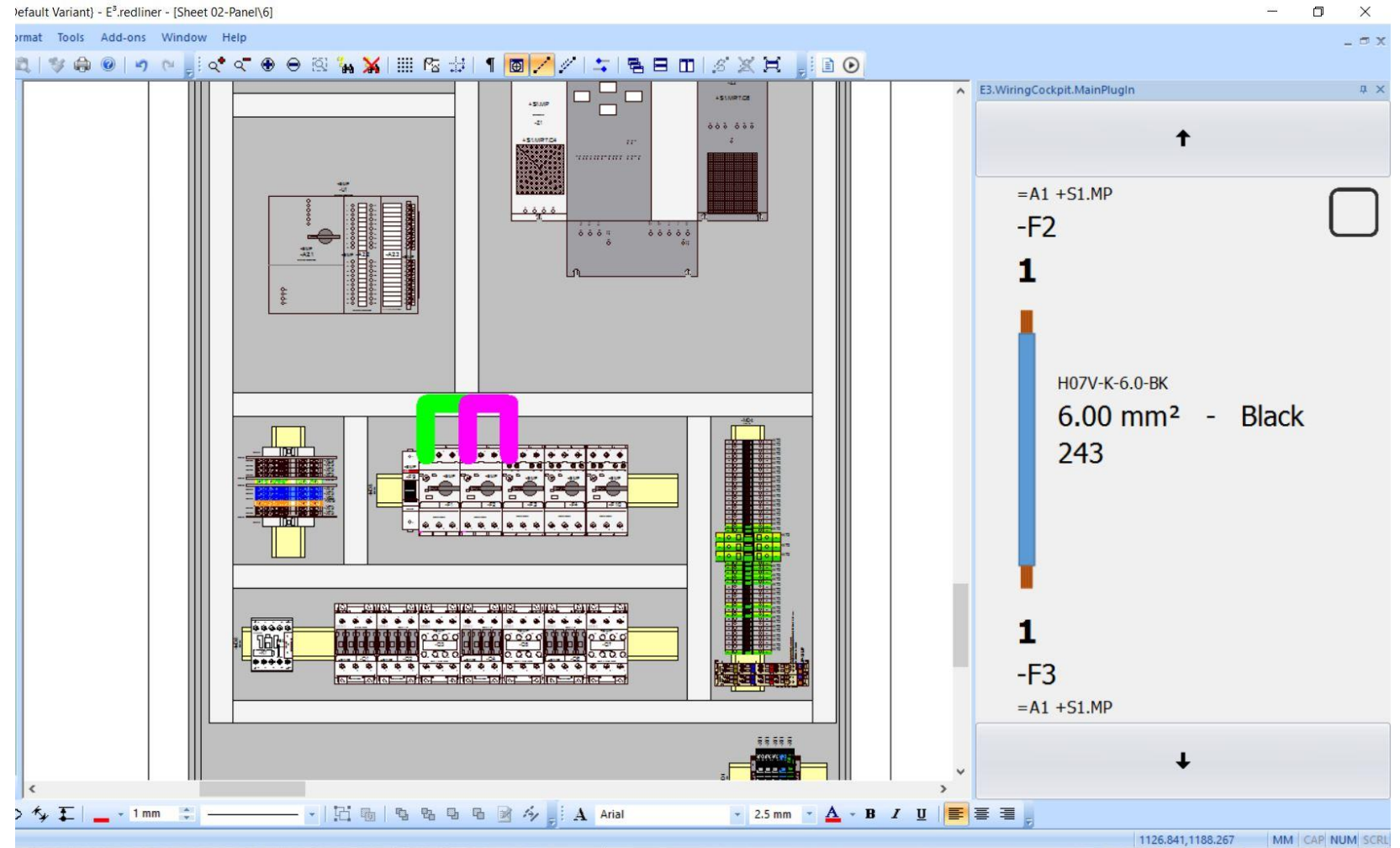
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- Labeling
 - Print labels
 - Integrated labeling systems
- Wire manufacturing with bundling
 - Add pin terminals
 - Print source / destination pin
 - Create wire bundles
- Milling and drilling
 - Create specific configurations



Assisted Wiring: E³.WiringCockpit

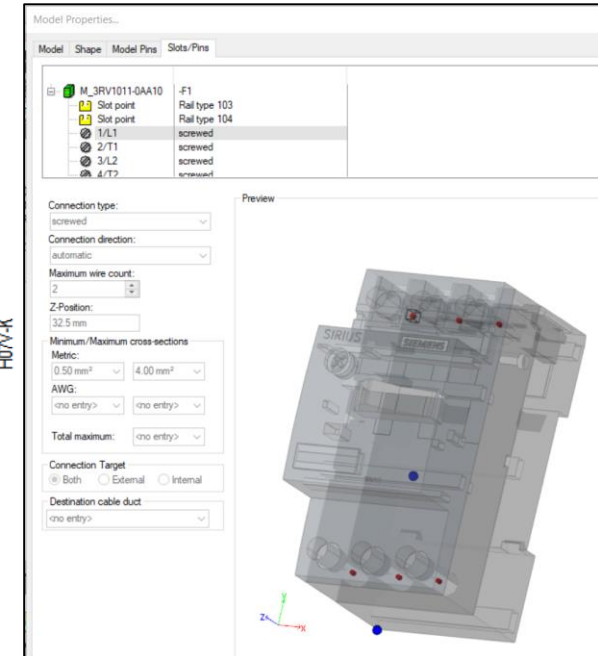
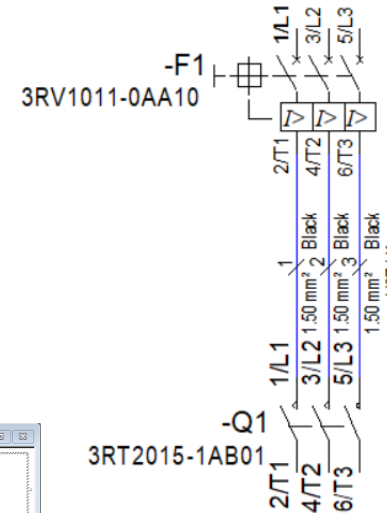
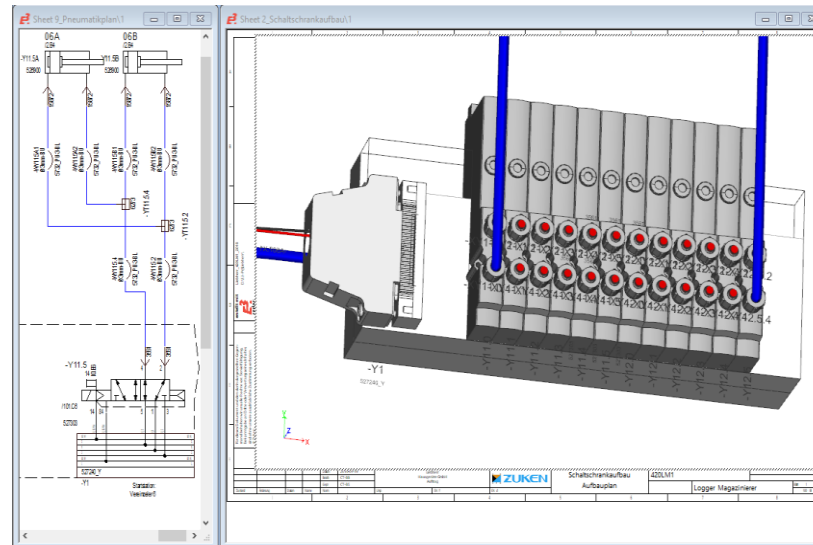
- Paperless wiring
- Highlighted wires
 - Current wire 
 - Wire in chain 



E3.series is based on Components

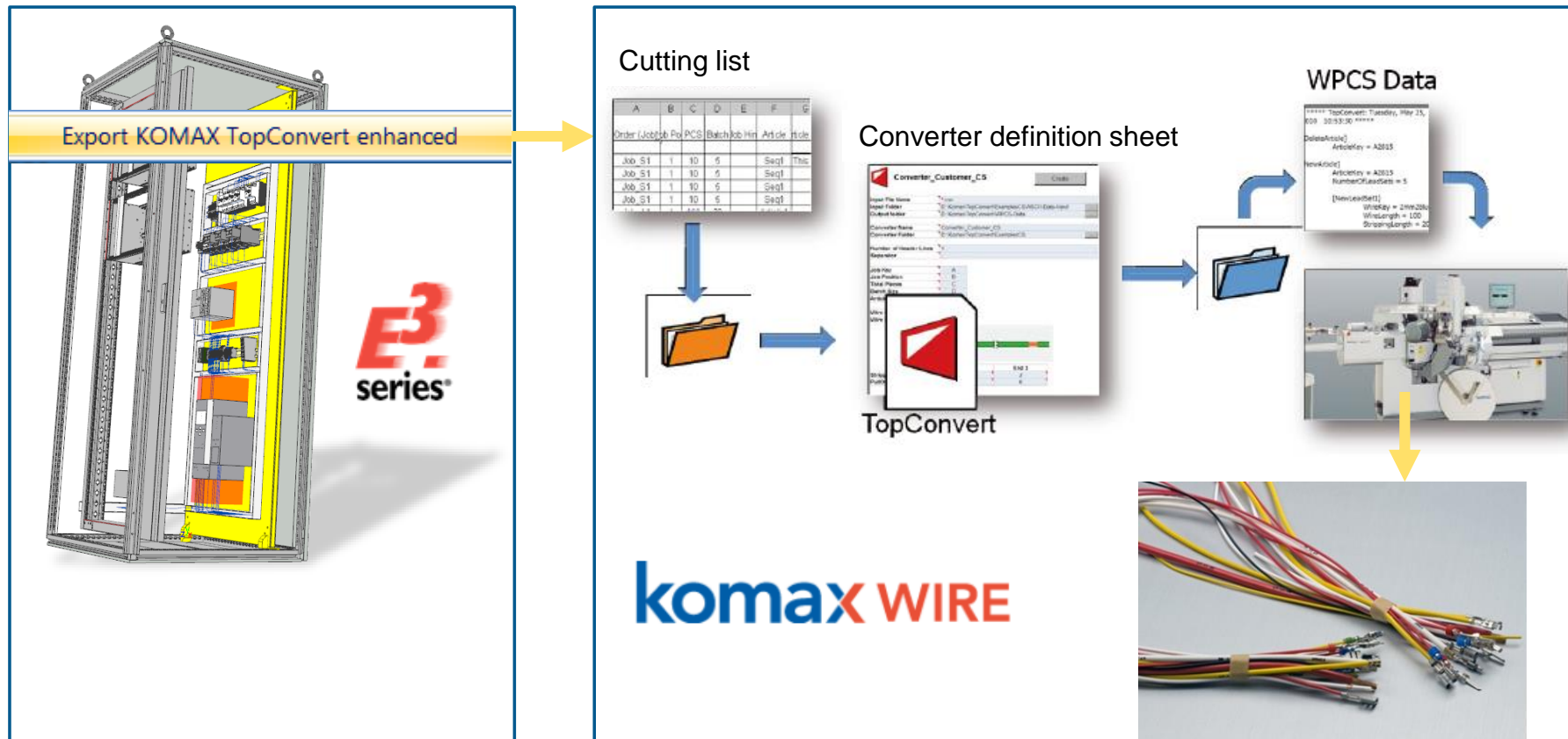


- Work with complete and proofed data
- E³.series is able to check based on these data e.g.
 - Wire size - > cross-section on physical pin
 - Count of connected wires
 - Collision control in cabinet
 - ...
- Easy creation of BOM



Digital Data boosts wire production

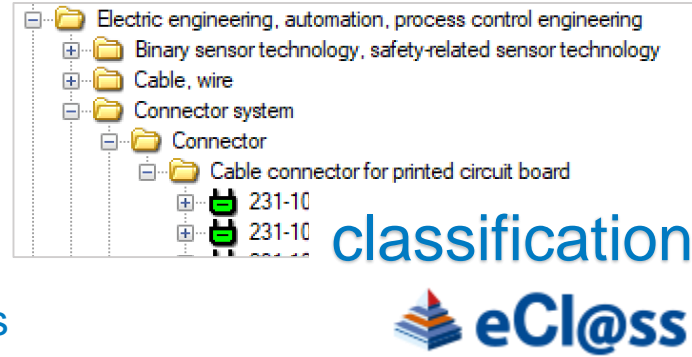
- Example: Komax automatic crimping machine TopConvert



Component Cloud Data Quality – What to expect

- Component

- Material Master data
- Technical data
- Properties and classification aligned to eCI@ss



Name	Entry
Class	Terminal (not overhead line)
Component Name	TMN_279-826_4x1,5mm_GY_WAG
Description	Series Terminal 4 x 1,5mm2 F
SAP ID Number	SSG888287
.HYPERLINK	https://www.wago.com/de/reihenklennen/4-leiter-durchgangsklemme/p/279-831
Article Name	279-831
ArticleNumber	279-831
Supplier	Wago
eCI_hi	
ecp_C	
zz_eCI	
zz_eCI	
zz_eCI	
zz_eCI@ss Level 3	Durchgangs-Reihenklemme
zz_eCI@ss Level en 0	Electric engineering, automation, process control engineering
zz_eCI@ss Level en 1	Electrical installation, device

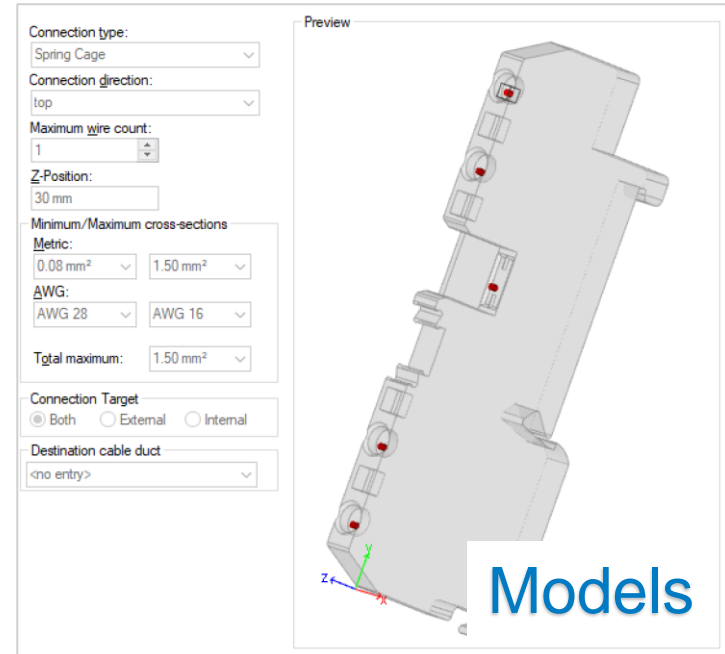
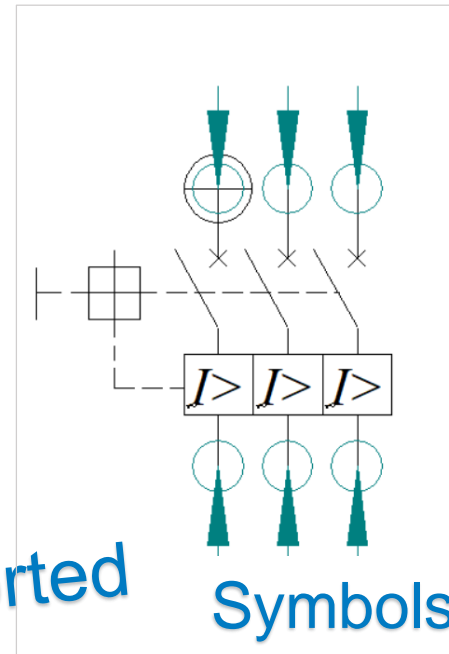
Technical properties

- Symbols

- Electrical Schematic Symbols based on IEC 60717
- fluid schematic Symbols based on ISO 1219
- Formboard symbols in original and scaled views

- Models

- 3D Models
- Enabled for automated routing
- With STEP and DXF views



quality ensured by ECAD-PORT

E3 Component Cloud – Who is Who

Providing high quality one-stop Component Service powered by:

CADENAS

- Parts management for mechanical CAD and E3.series
- > 500 Manufacturer catalogues available
- Parts are sponsored by manufacturers
- tool chain for engineering and sourcing



ECAD-PORT

- Standardization of E3.series components
- Component database creation service
- Supporting manufacturer and users in E3.database
- Global network of E3.series service suppliers



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- E3.series: Electrical wiring, control systems and fluid engineering software
- Component based and object orientated system with powerful check capabilities
- World wide sales and support



COOPERATION
Intelligent Electronic Parts for E³.series



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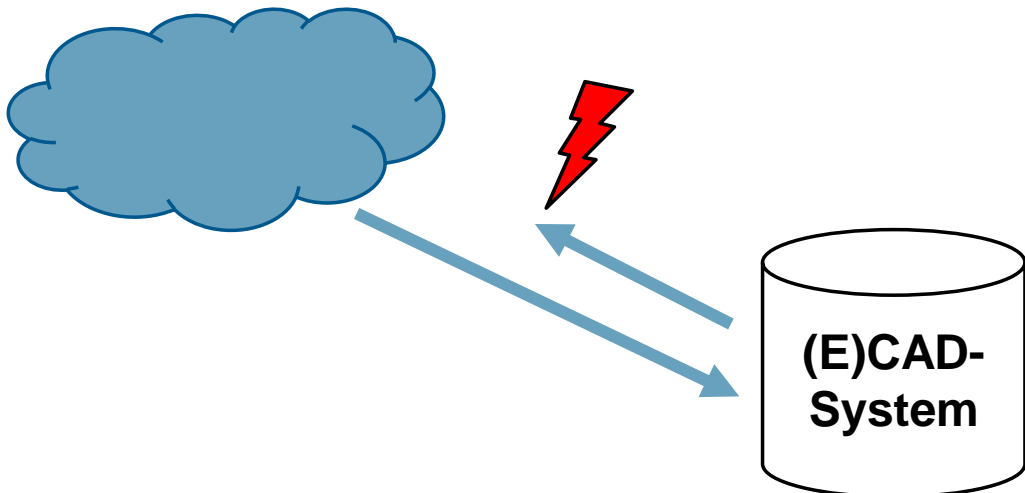


Keeping track of Component lifecycle – What kind of support is delivered by CADENAS? - Product Change Notifications possible? -

1st Case:



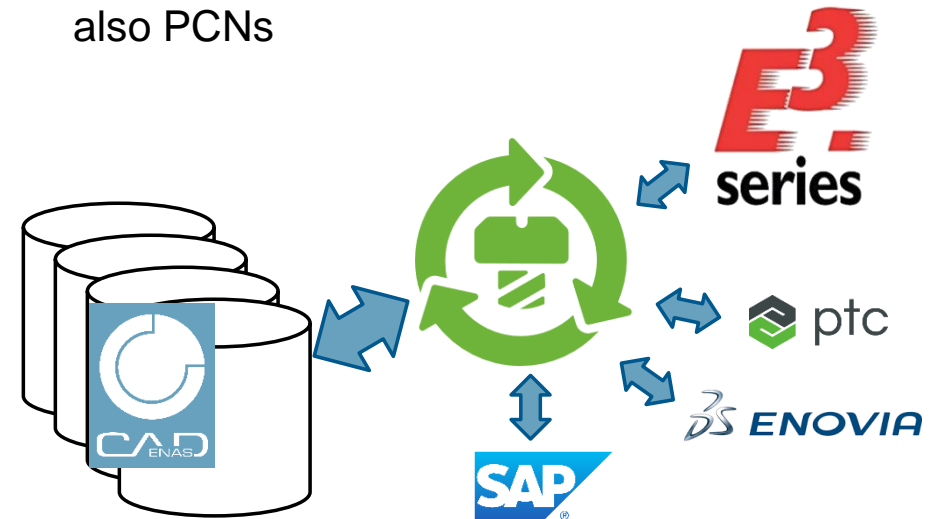
- Downloading components from Component Cloud
- No business relationship in place between cloud and user
- Updates can be triggered manually



2nd Case:



- PARTsolutions with Component Cloud functionality as enterprise solution in place
- Regular catalogue updates by CADENAS possible
- PARTmanagement as single source of truth for all material using systems in enterprise communicates also PCNs



E3.Component Portal



The screenshot displays the E3.Component Portal software interface. On the left, a table lists product details for part number 09330062601. The central area shows a 3D model of the connector with electrical connection points labeled. On the right, the 'Device Properties' dialog box is open, showing a tree view of the component's classification and a list of database entries for various languages.

Property	Value
PRODUCT_PICTURE	09_33_006_2601_cmyk01.tif_thumb.g
DESCSHORT	Han E®, Inserts; Screw termination; ?
DESCLONG	Han E®, Inserts; Screw termination; ?
SUPPLIERALTNO	09 33 006 2601
MANUID	09330062601
MANUFACTURER	HARTING
MANUTYPEDESC	Han E 06 Pos. M Insert Screw
DELTIME	0
CNSECCLASS90	27-44-02-05
AAB499	6
AAB500	16
AAB754	Pin
AAB789	2.500
AAB940	0.750
AAC036	Yes
AAC049	Yes
AAK496	Thermoplast
AAO676	09330062601
AAO677	HARTING
AAO736	09330062601

Name	Entry
Article number	1-1103637-1
Class	HTS connector
Description	HTS, HE.10 Series, Insert, Size 4, Screw Terminal, Socket
Main Class	Electric
Supplier	AMP/Tyco
Component Group	HTS_BG4
Data sheet	HE10_Inserts.pdf
Database Class Chinese	连接器HTS
Database Class Dutch	HTS connector
Database Class English	HTS connector
Database Class French	HTS Connecteur
Database Class German	HTS-Steckverbinder
Database Class Italian	Connettori HTS
Database Class Japanese	HTSコネクタ
Database Class Portuguese	Conectores HTS
Database Class Russian	Соединители серии HTS (Электрика)
Database Class Spanish	Conector HTS
Database Class Turkish	HTS konektör
Database Description Chinese	HTS, HE.10 Series, Insert, Size 4, Screw Terminal, Socket
Database Description Dutch	HTS, HE.10 Series, Insert, Size 4, Screw Terminal, Socket
Database Description Finnish	HTS, HE.10 Series, Insert, Size 4, Screw Terminal, Socket



Any Questions?

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The image features the ZUKEN logo in a bold, white, sans-serif font. The letters 'Z' and 'U' are particularly prominent. A registered trademark symbol (®) is located to the upper right of the 'N'. The background of the entire image is a dark blue gradient with a faint world map and a network of glowing white nodes and connecting lines, suggesting global connectivity and technology.

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