The Partner For Success

ZUKEN®

Enabling the Digital Twin for Mechatronic Systems with Electrified Component Data

Joachim Frank

Managing Director Zuken E3 GmbH, Ulm

40 years of success and innovation
in electronic and electrical engineering

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

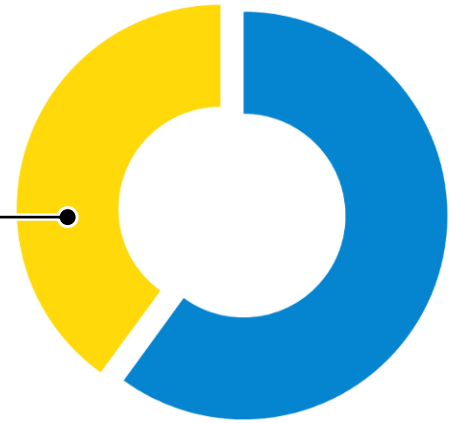
Zuken is an engineering-driven organization
focused on customer value

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

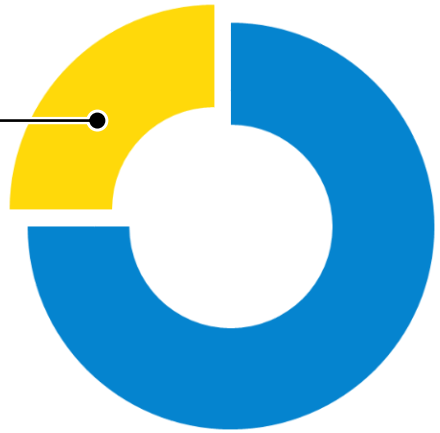
Engineering Resources

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

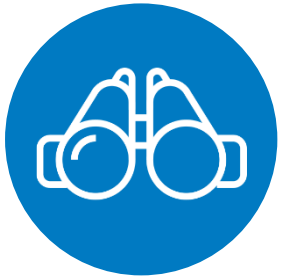

Power


Life Sciences


Automotive / Special Vehicles


Railway


Aerospace


Military / Defense

Agenda

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

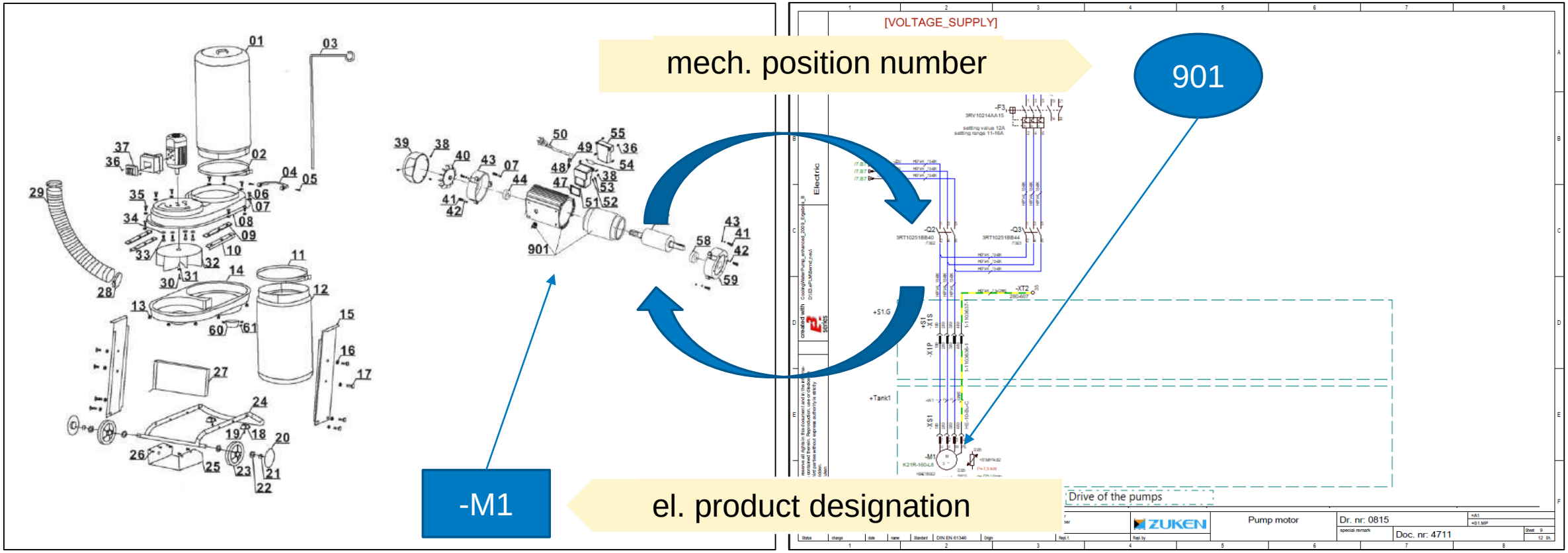
- In the Machinery industry
  - IoT, Industry 4.0, Smart Factory

Factory which autonomously perform optimal production = CASE

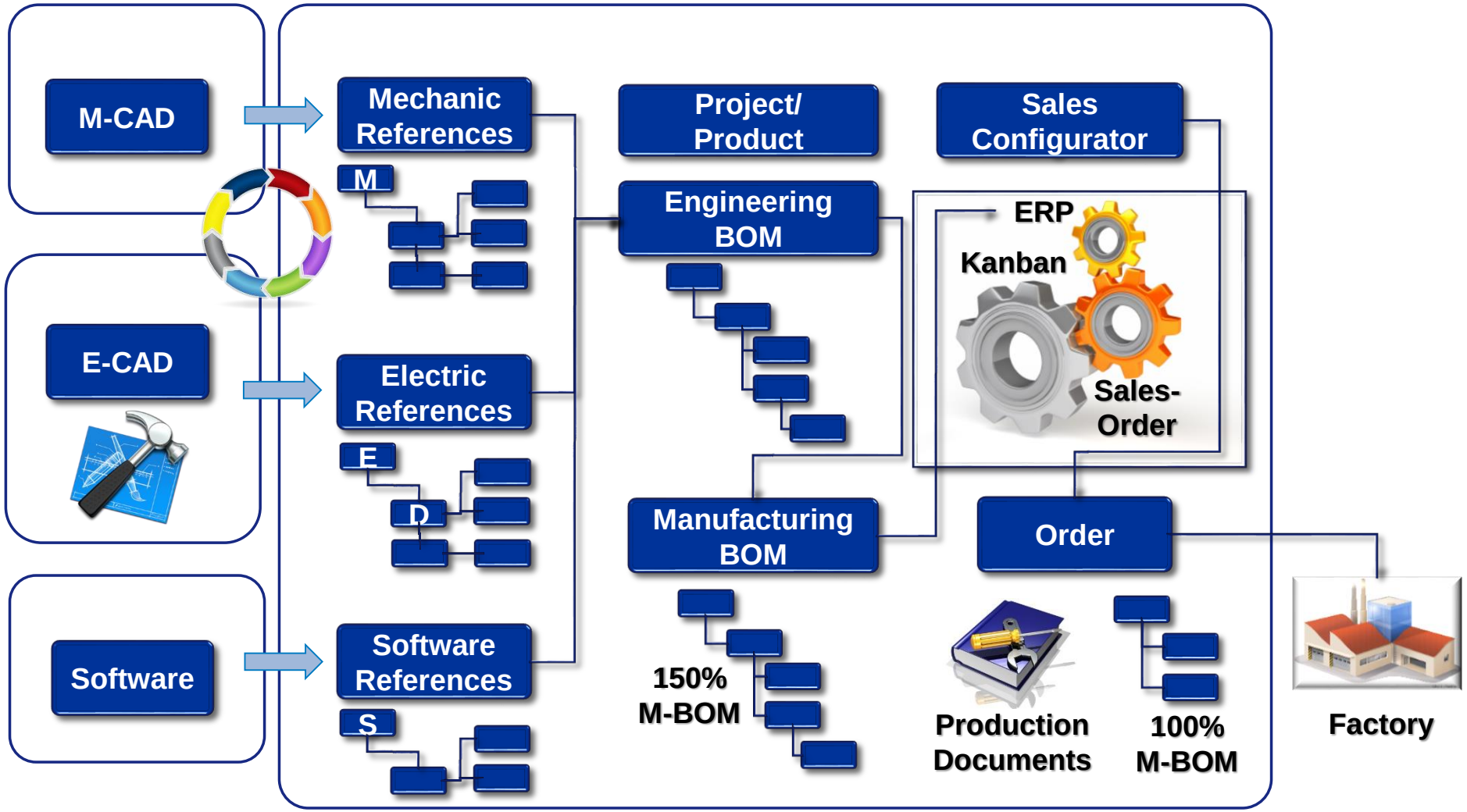
Industry trend: Digitalization

Creates new values and business opportunities

Mechatronic System Design



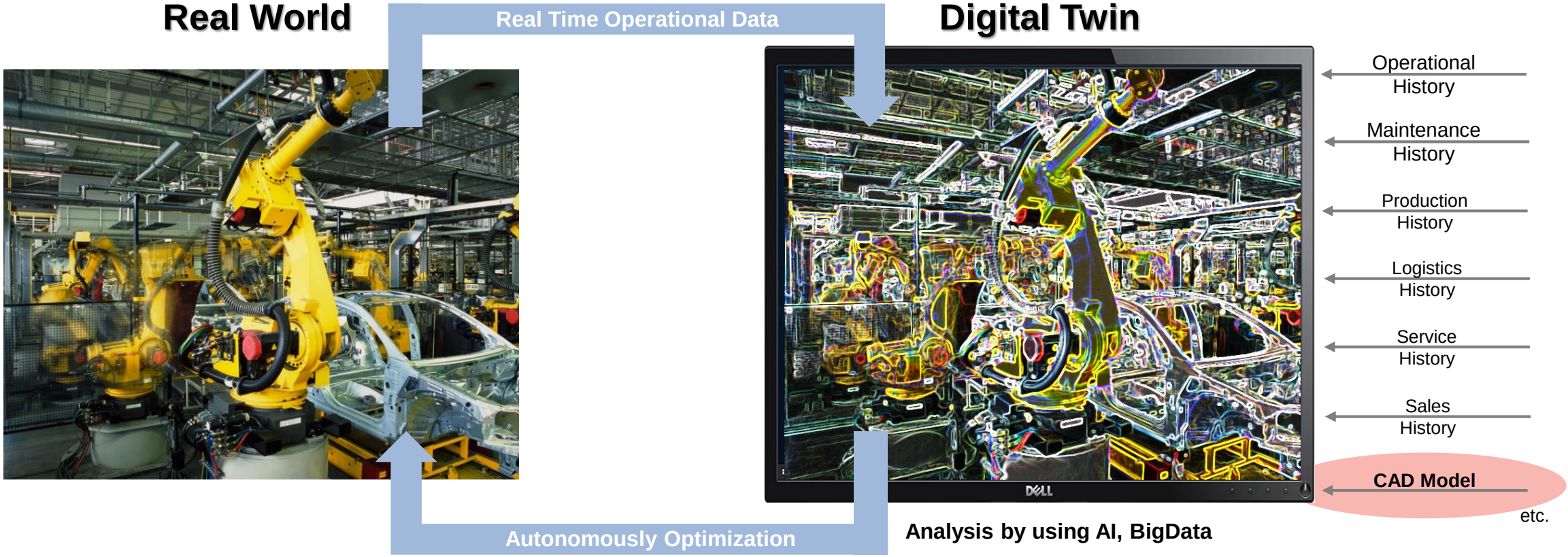
Mechatronic System Design Process



Mechatronic System Design

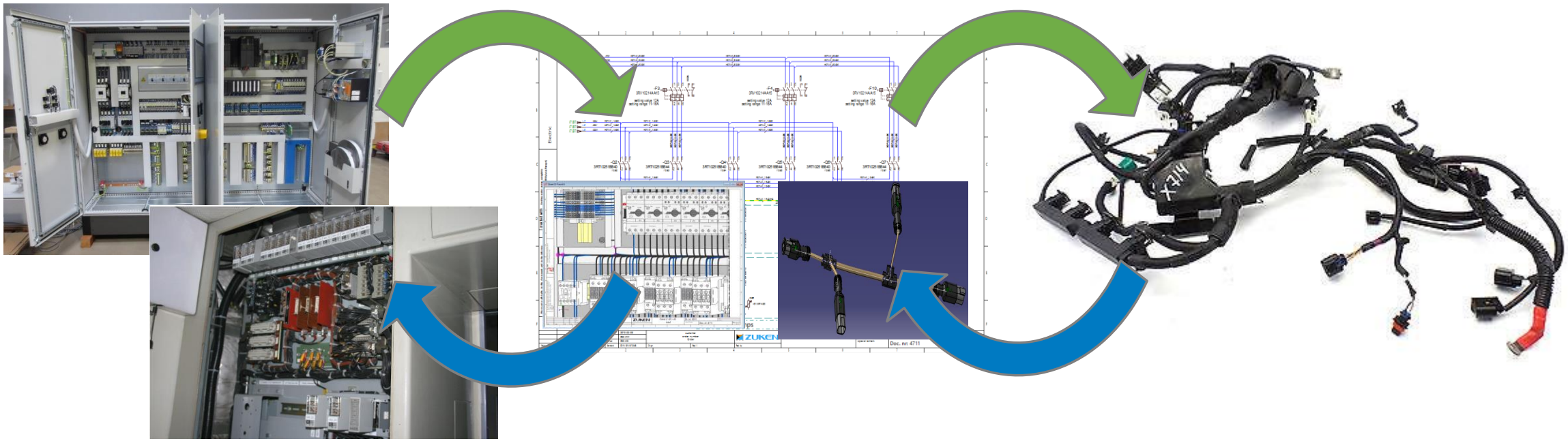
To realize “Business Digitalization”

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



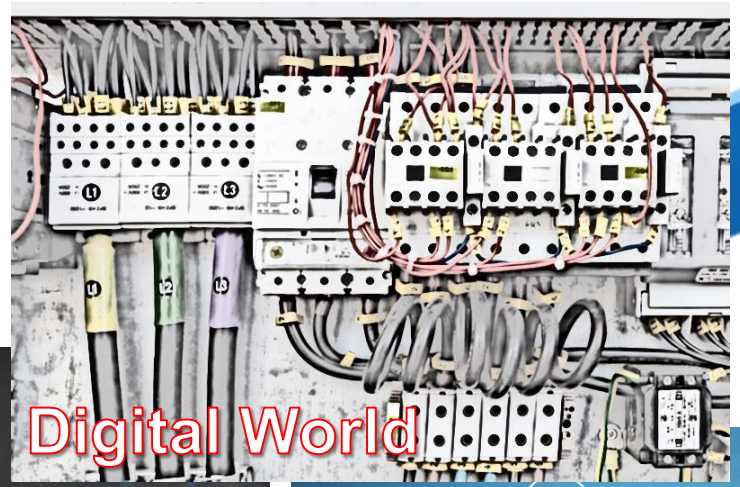
Mechatronic System Design

- 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



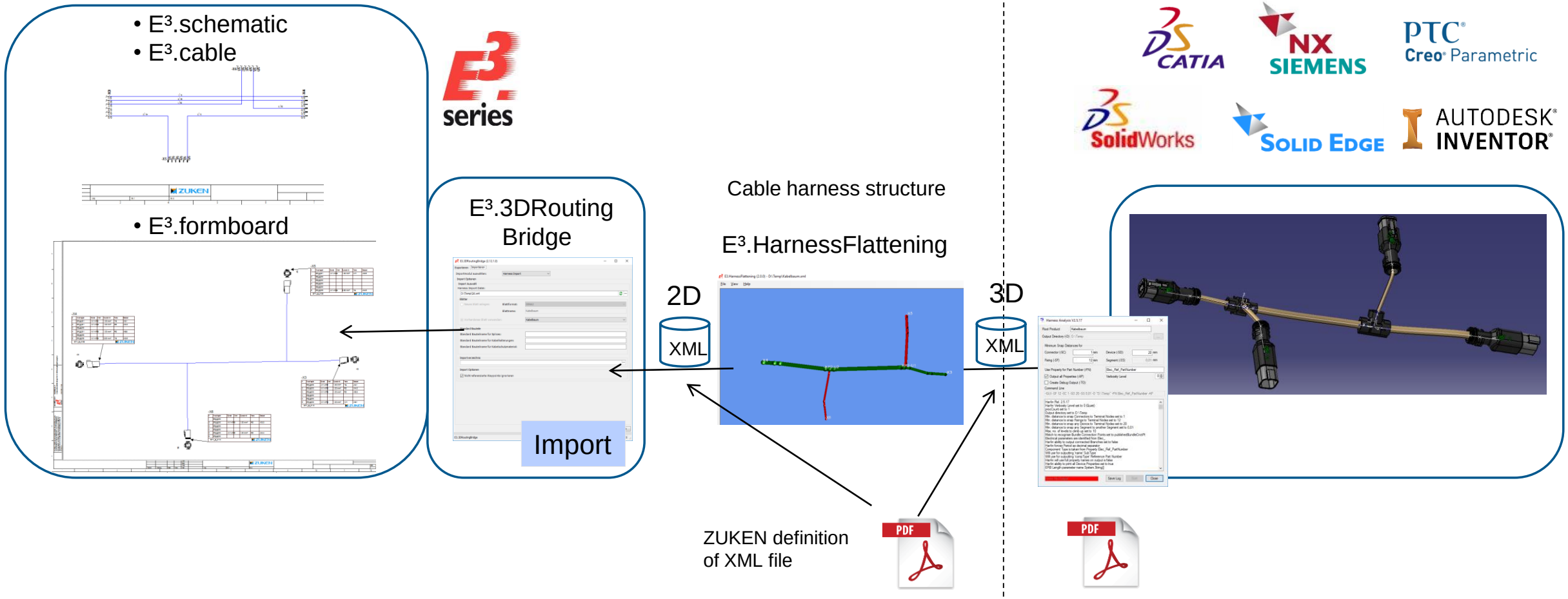
Digitalization

E3 series

Accurate & efficient dev.

Harness design process with E³.formboard

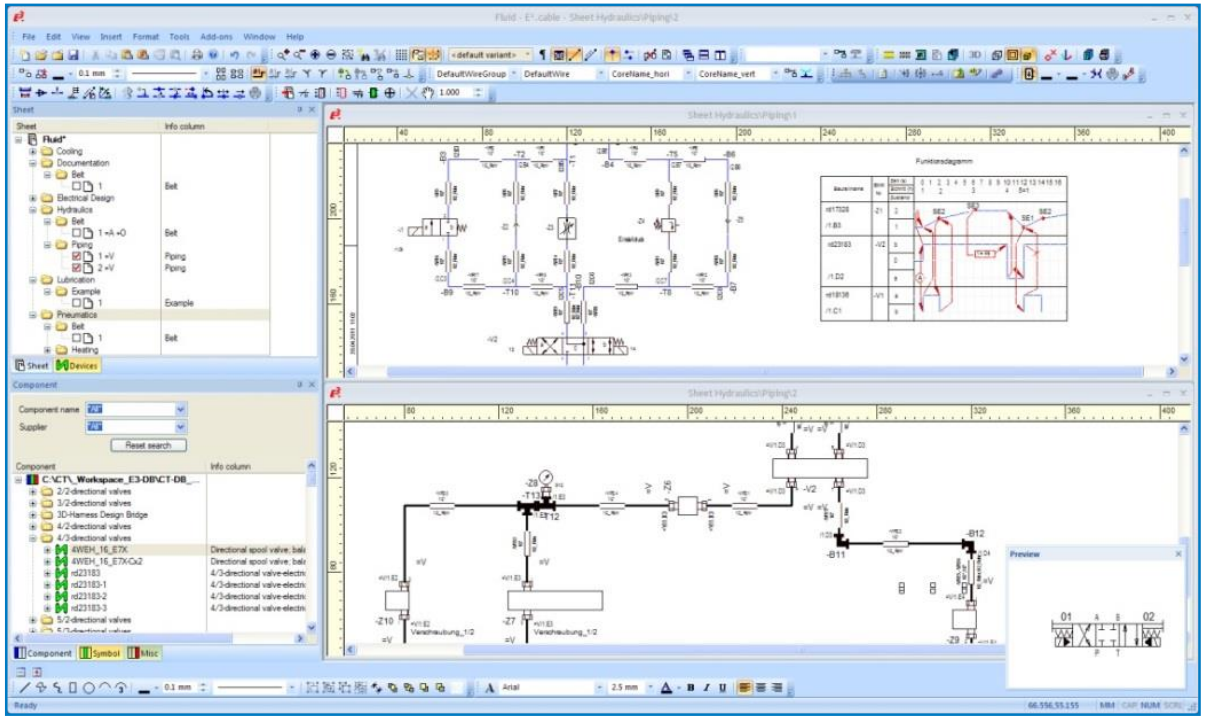
- Example



Fluid Design with E³.fluid

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

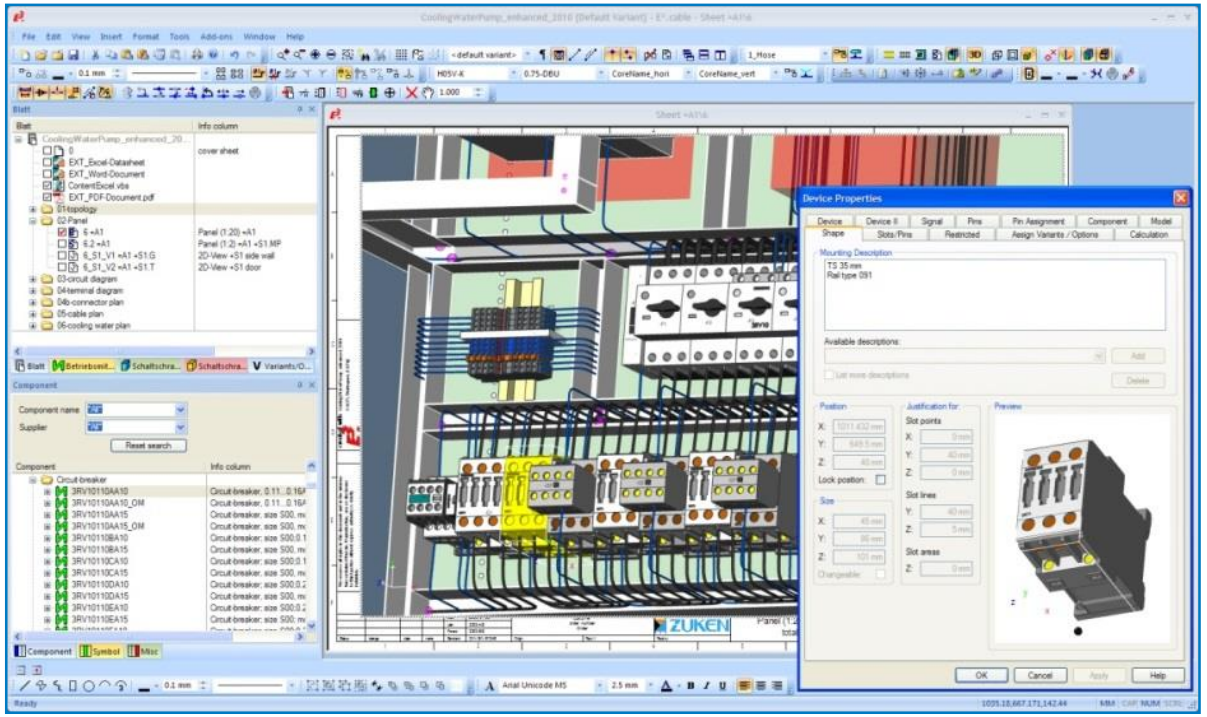
- Complete documentation
  - Fluid plan
  - Specific reports
  - Production documentation
  - Customer documentation
  - Manufacturing and service



Cabinet Layout with E³.panel

- E³.panel
  - For Cabinet layout and wiring
  - Complete solution easy to use

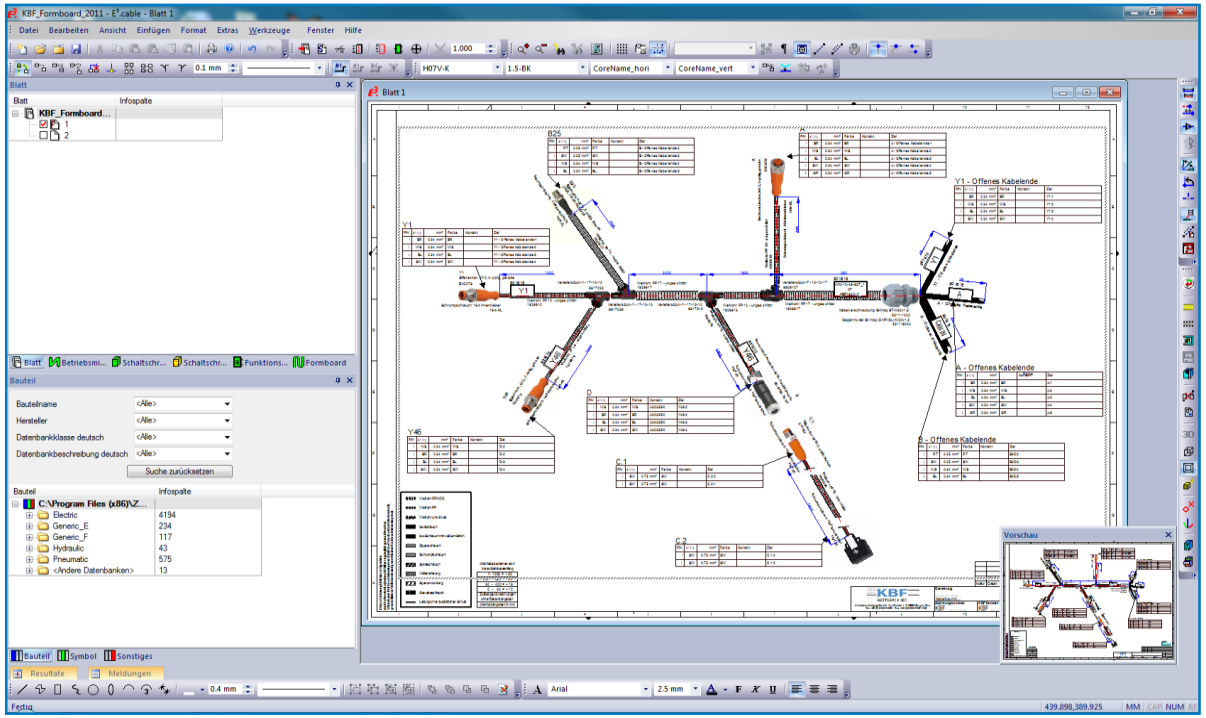
- Layout module for E³.schematic and E³.cable
  - 2D / 3D cabinet layout
  - Automatic routing
  - Manufacturing integration
    - Labeling
    - Strip- cut- and mark machines
    - Drilling and milling
    - Specific reports



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

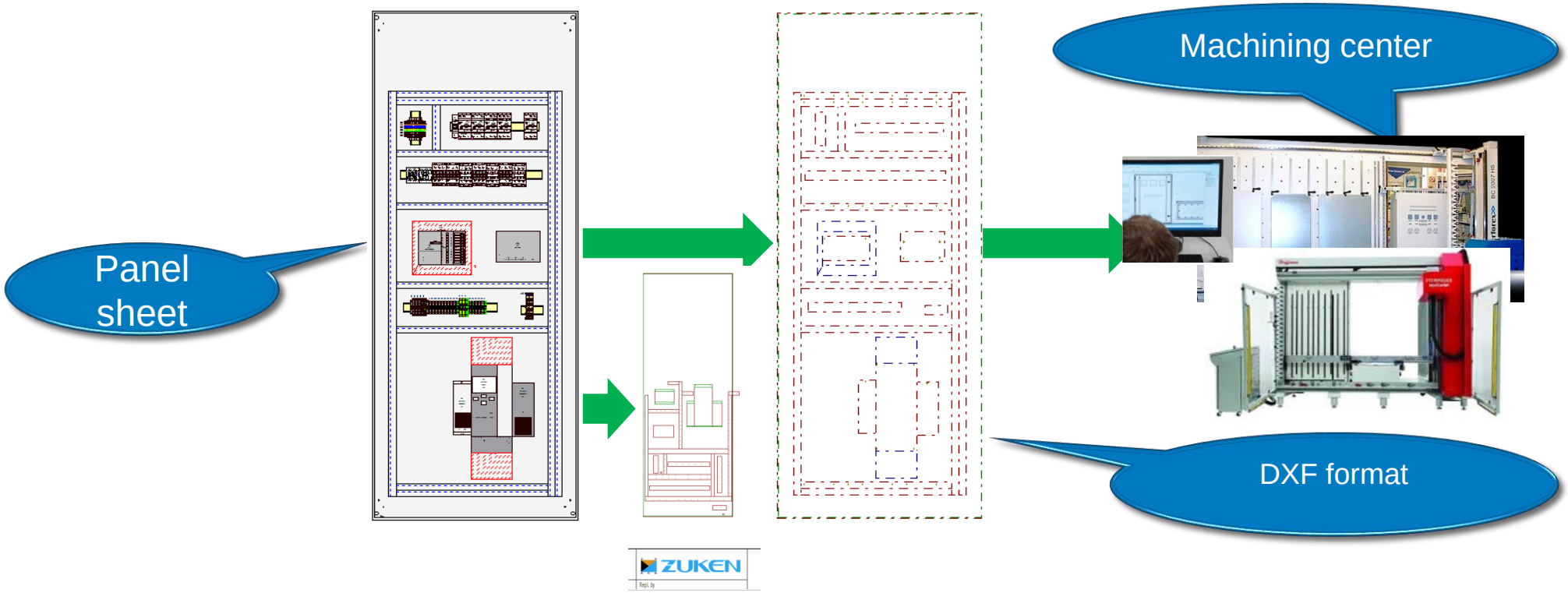
Production facility

Industrial plant

Others (Electrical equipment)

Digital Manufacturing

- 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

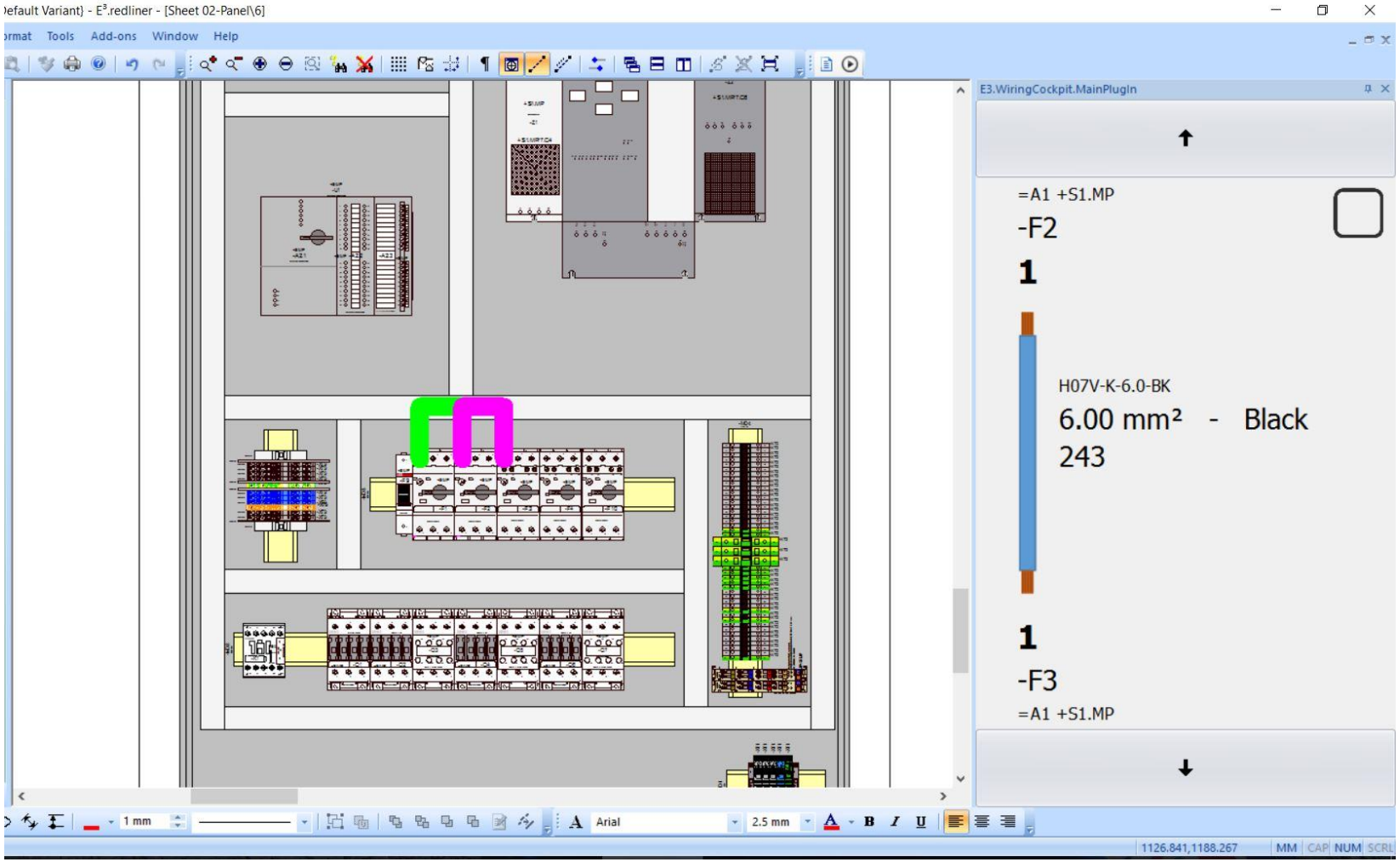
- Labeling
  - Print labels
  - Integrated labeling systems

- 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

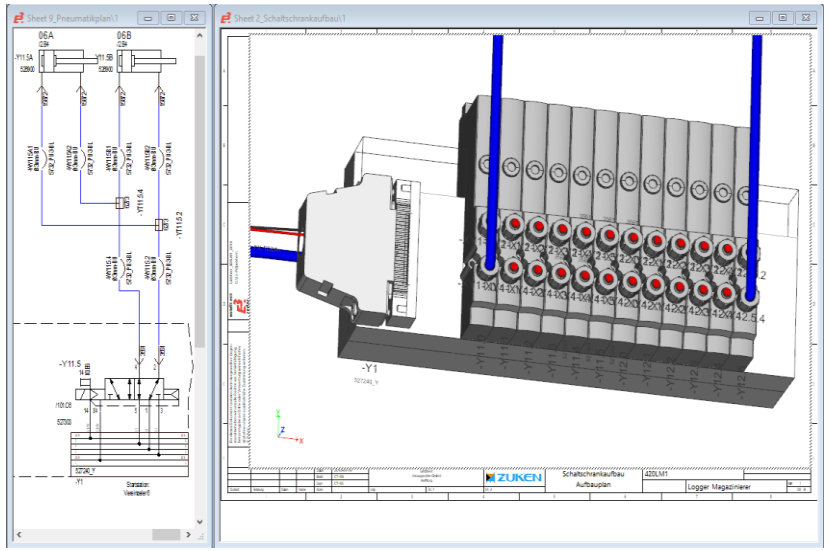


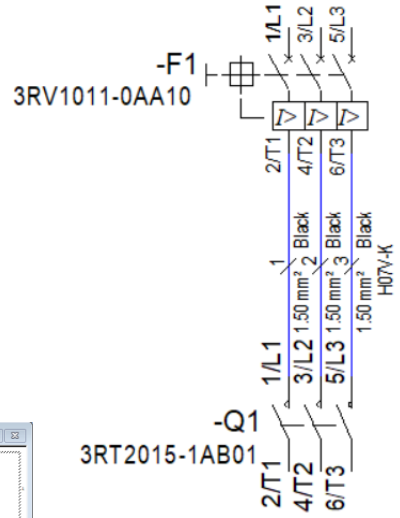
E3.series is based on Components

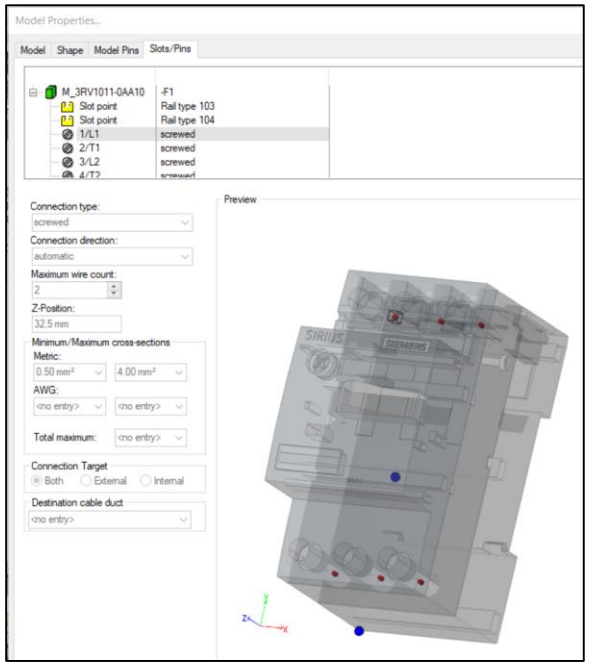
- Work with complete and proofed data

- 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

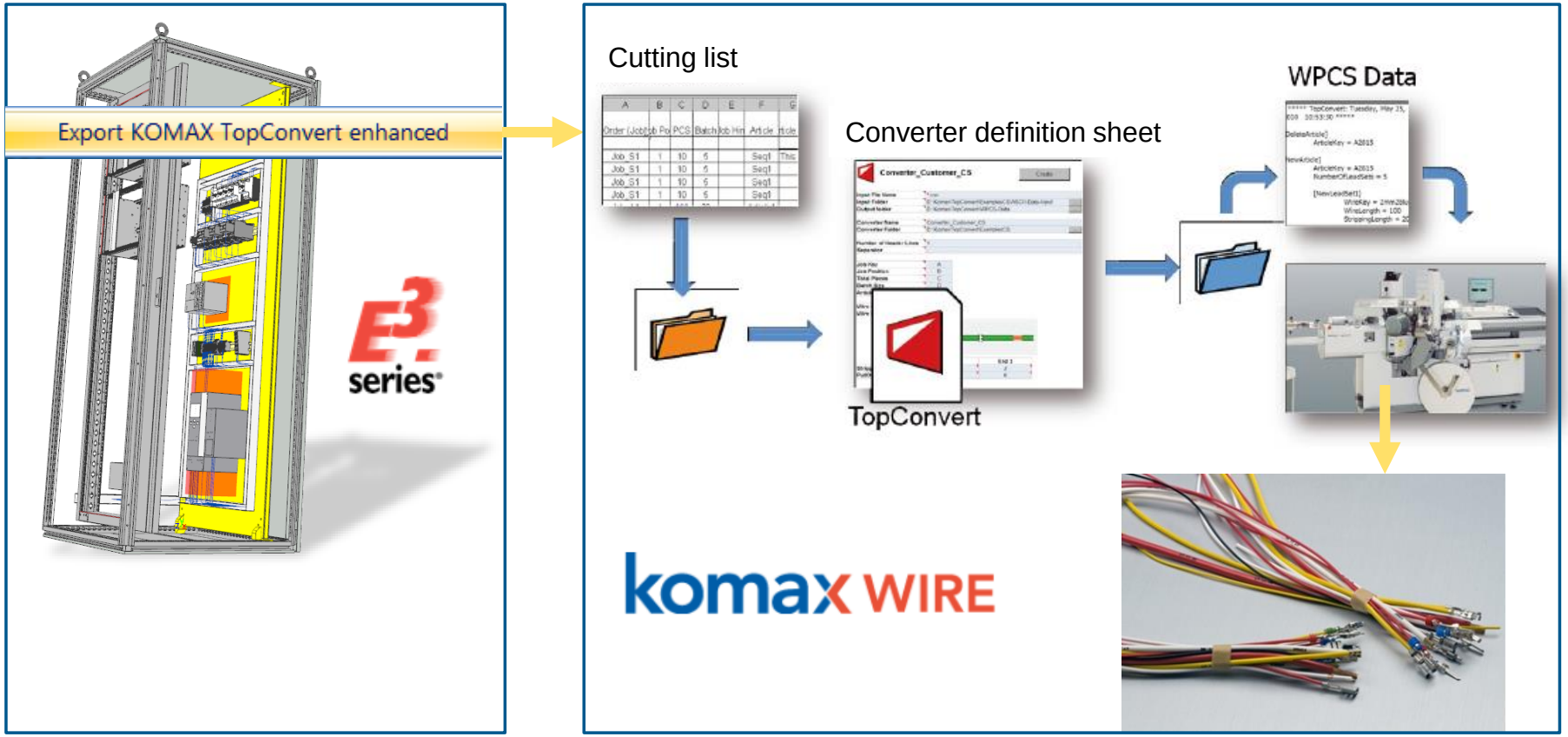






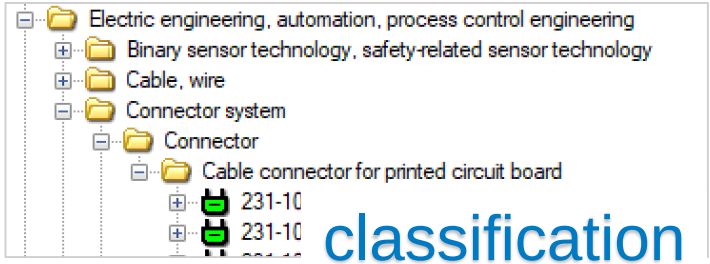
Digital Data boosts wire production

- Example: Komax automatic crimping machine TopConvert



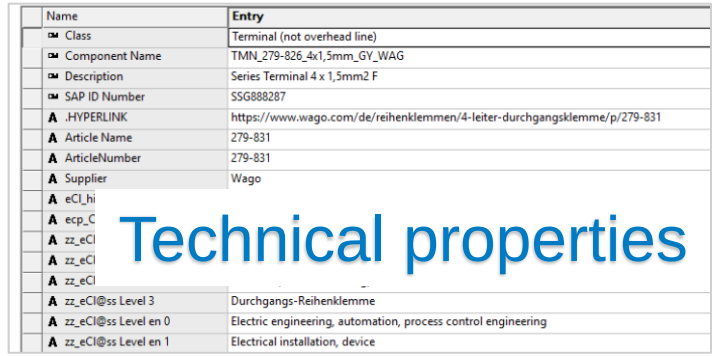
Component Cloud Data Quality – What to expect

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

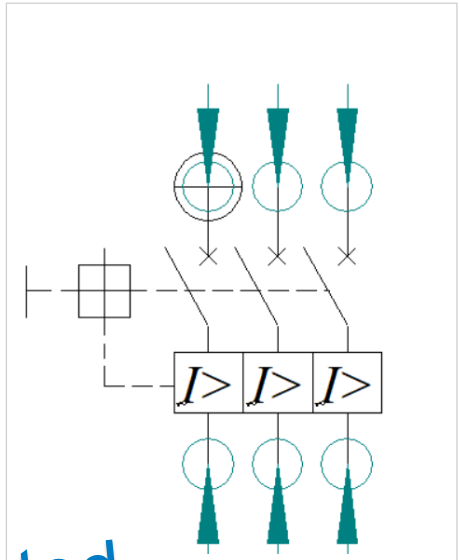


classification

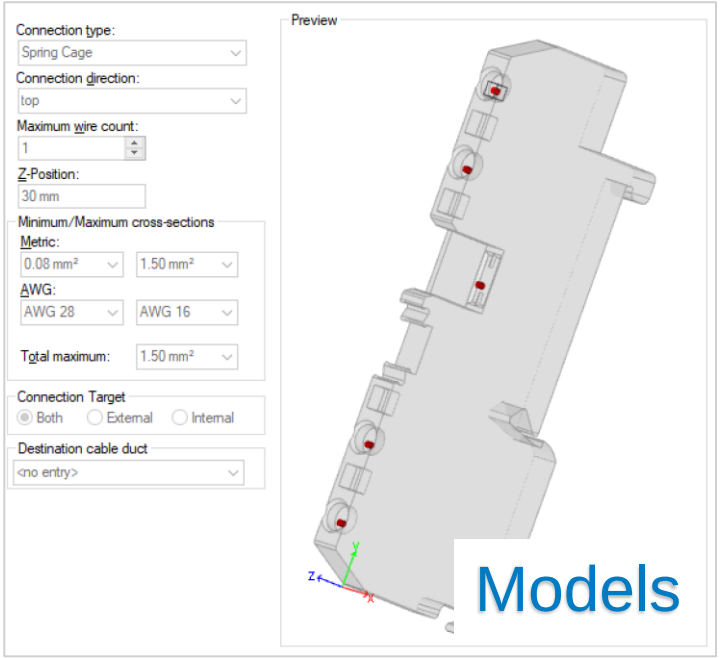
eCl@ss



Technical properties



Symbols



Models

Manufacturer supported

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

ZUKEN

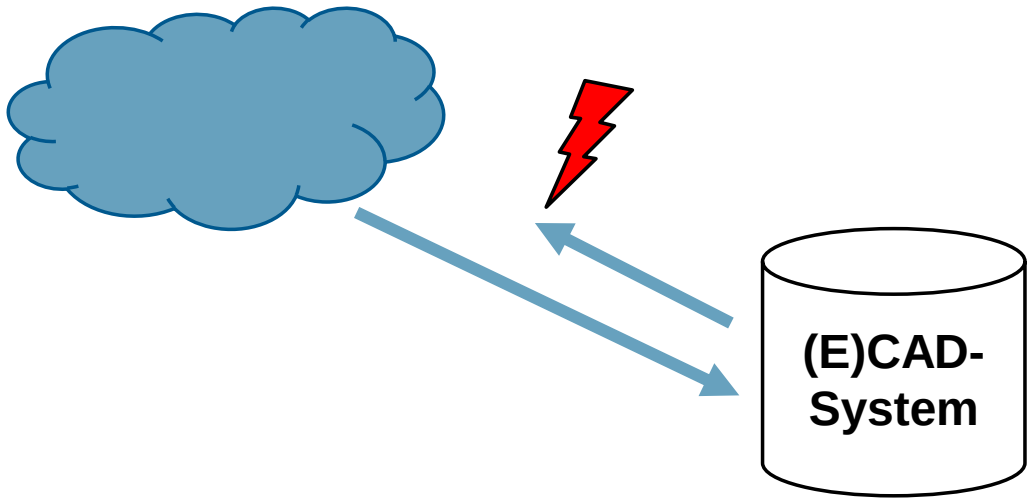
- E3.series: Electrical wiring, control systems and fluid engineering software
- Component based and object orientated system with powerful check capabilities
- World wide sales and support

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

1st Case:

PARTcommunity

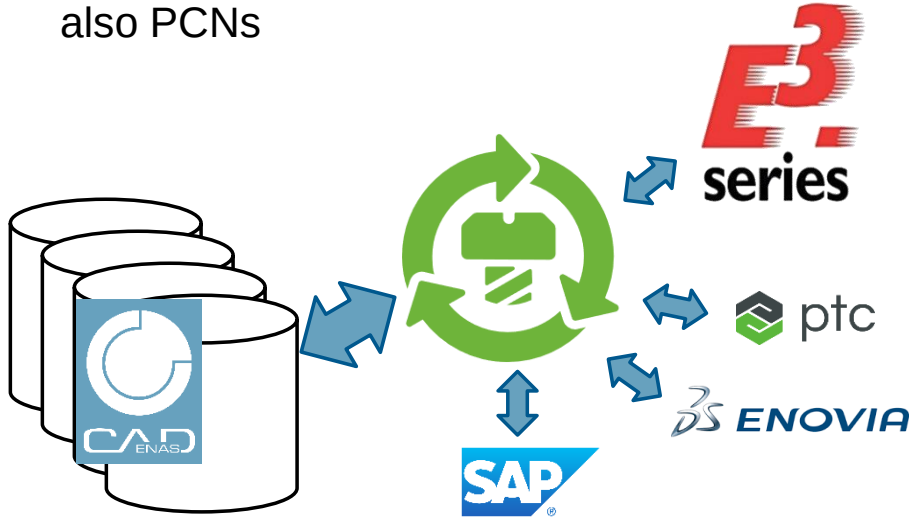
- Downloading components from Component Cloud
- No business relationship in place between cloud and user
- Updates can be triggered manually



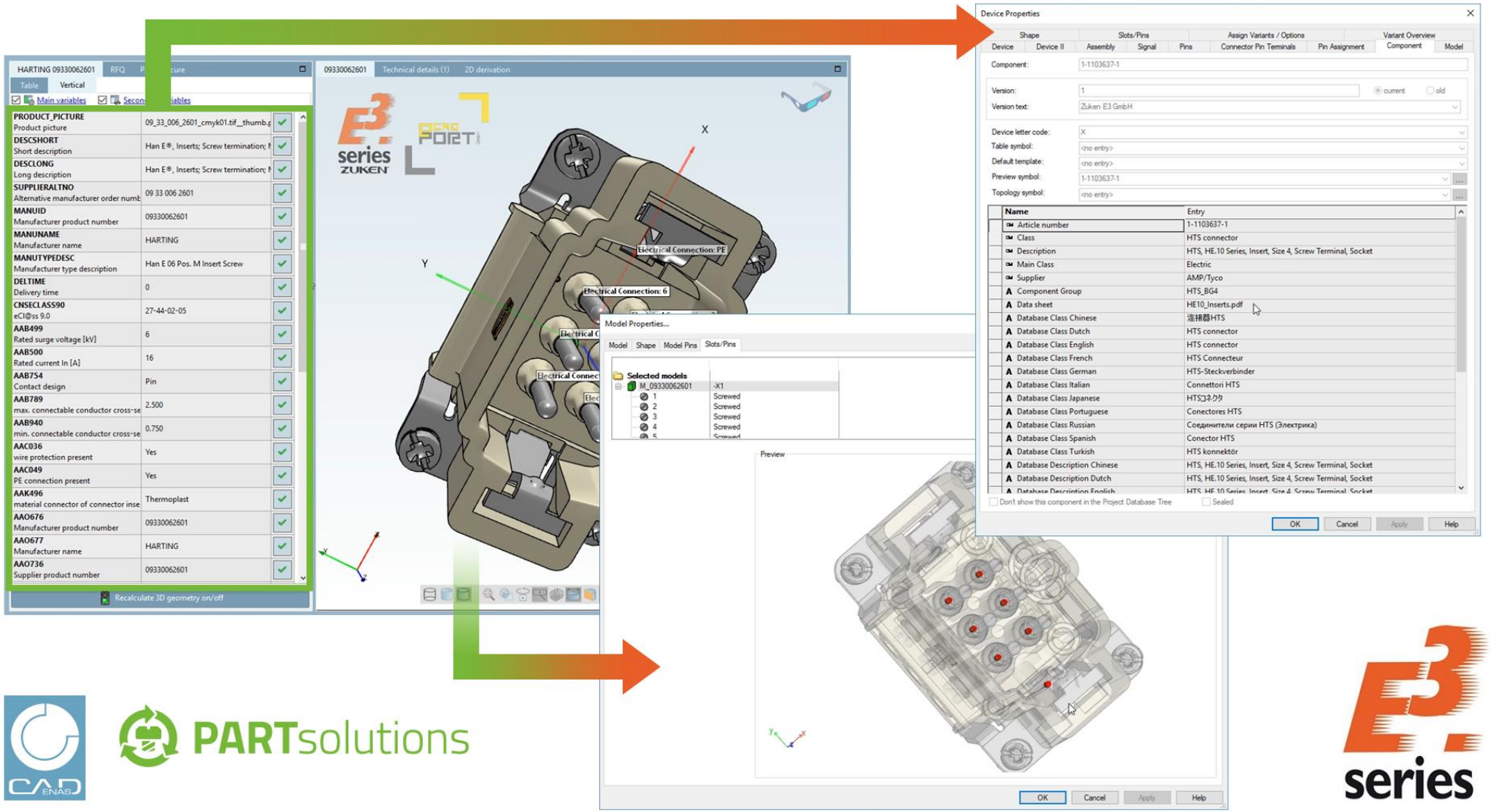
2nd Case:

PARTsolutions

- 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



PARTsolutions

series

VIDEO

Any Questions?

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