

From engineering to the customer

End-to-end use of the asset administration shell as a digital twin

10.04.2024 | Bernd Vojanec



WITTENSTEIN

Contents

- WITTENSTEIN SE
 - Digital Twin / Asset Administration Shell (AAS)
- Pioneering new technologies with CADENAS
 - WITTENSTEIN goes CADENAS
 - CADENAS & AAS in the Customer Journey
 - AAS implementation
- AAS in After-Sales
- Summary



Bernd Vojanec













Senior Expert

Industrial Digital Twin

Bernd.Vojanec@wittenstein.de

WITTENSTEIN SE

Mechanical and mechatronic drive solutions

 <p>WITTENSTEIN alpha GmbH</p> <p>Hochpräzise Servoantriebe und Linearsysteme</p> 	 <p>WITTENSTEIN cyber motor GmbH</p> <p>Hochdynamische Servomotoren und Antriebs-Elektroniken</p> 	 <p>WITTENSTEIN galaxie GmbH</p> <p>Überlegene Getriebe und Antriebssysteme</p> 	 <p>WITTENSTEIN motion control GmbH</p> <p>Antriebssysteme für extremste Umwelthanforderungen</p> 	 <p>attocube systems AG</p> <p>Nanoprazise Antriebs- und Messtechniklösungen</p> 	 <p>baramundi software GmbH</p> <p>Sicheres Managen von IT-Infrastruktur in Büro und Produktion</p> 
---	---	---	---	--	---

WITTENSTEIN SE

Asset Administration Shell – Standardization of digital twins

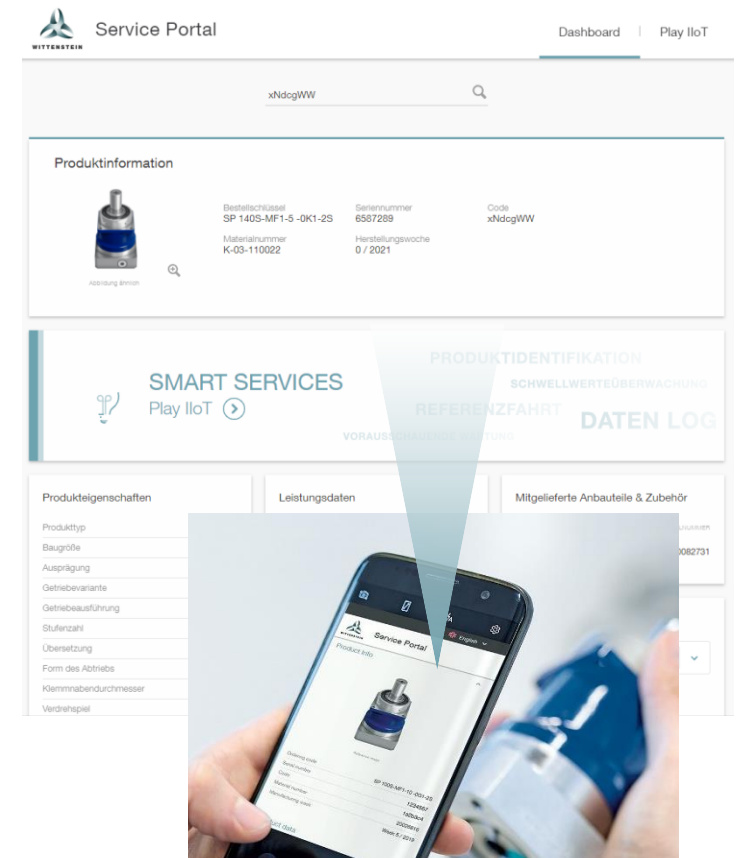
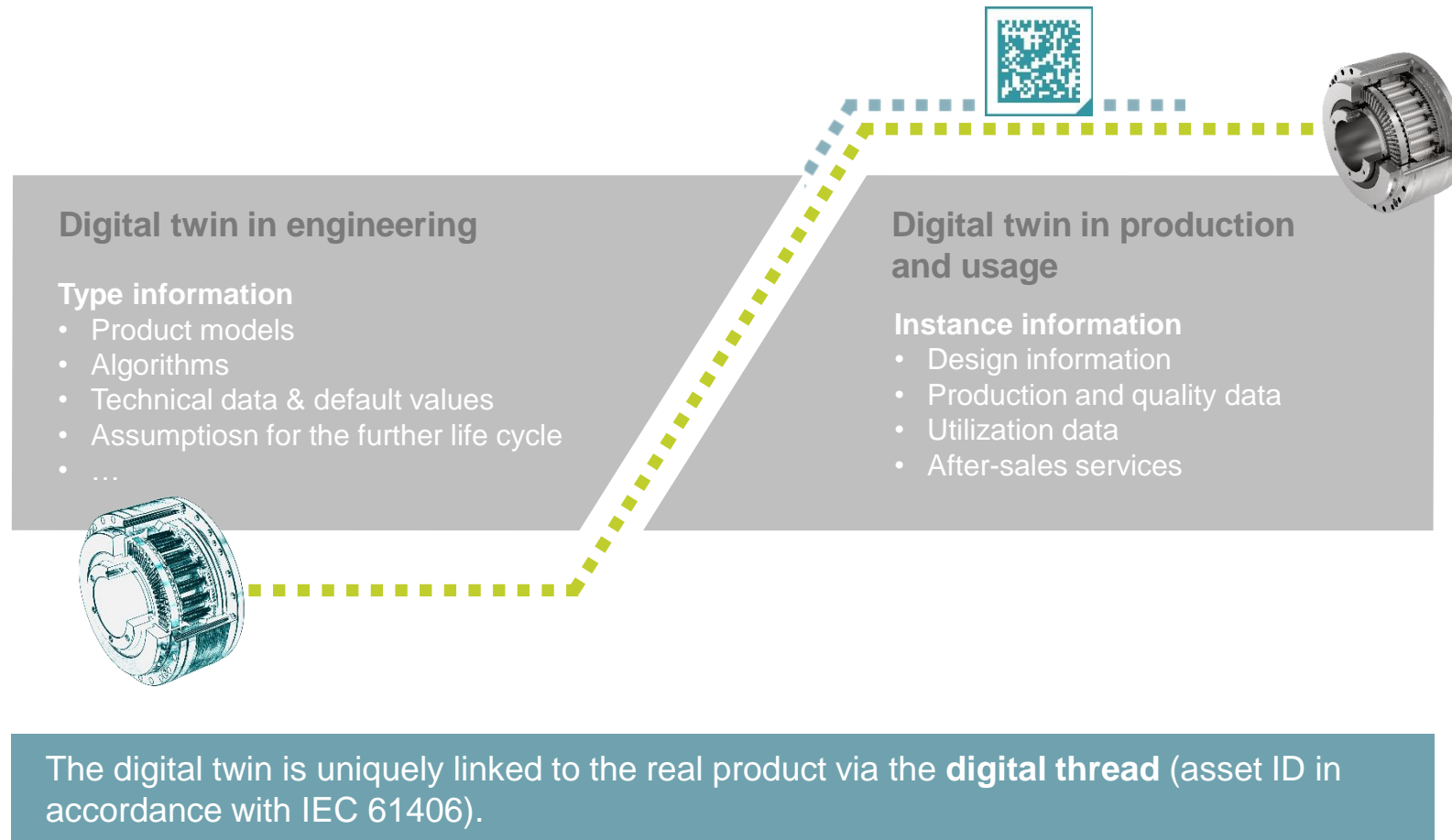
As a founding member of the Industrial Digital Twin Association e. V. (IDTA), WITTENSTEIN brings the Asset Administration Shell into application as a standardized digital twin:

- New service offerings and digital business models based on **standardized data exchange**
- **Interoperability** as a basis for **scalable integration**
- **Reuse of data** along the product life cycle and across company boundaries
- **Investment protection** through IEC standard and user organization with more than 100 members



WITTENSTEIN SE

Digital twin for end-to-end connectivity



WITTENSTEIN goes CADENAS

Catalog online since November 2022



CAD Modelle
Admin

Geben Sie Schlüsselwort(e), eine Bestellnummer oder einen Typenname für die Volltextsuche

🏠
🏠
🇩🇪

WITTENSTEIN

Servomotoren

09.02.2024

Servoaktuatoren

30.01.2024

Servoregler

26.01.2024

Servoantriebssysteme

09.02.2024

Zubehör

09.02.2024

Copyright

29.11.2023

Faster development, faster to market:

WITTENSTEIN goes CADENAS...

... with a new addition to the cyber® simco® line toolkit for servo systems

At the SPS 2022 trade fair from November 8 to 10 in Nuremberg, WITTENSTEIN cyber motor (Hall 4, Stand 4-221) will be presenting new services and products for all aspects of the company's servo solutions. For example, selected products from the standard portfolio are now integrated in CADENAS, the electronic product catalog. Worldwide, around 15 million users in the machine and plant engineering industry thus have access to up-to-date 2D and 3D CAD models, CAE models and 3D PDF data sheets for WITTENSTEIN servo solutions at any time. Among other things, these include the cyber® simco® drive 2 (SIM2100), the new servo drive variant which is ideal for mobile applications thanks to optimized performance parameters and enhanced safety features. The cyber® distribution box – a distribution module for cost-efficient wiring of decentralized drives – is another addition to the portfolio of industrial servo solutions.

The integration in CADENAS, the cyber® simco® drive 2 (SIM2100) servo drive variant – now with optimized performance and safety features – and the cyber® distribution box underline WITTENSTEIN's commitment to "efficiency engineering" at all levels. The aim is to excite customers and users again and again and to offer them the greatest possible, measurable benefit.

Press Release

November 8, 2022

WITTENSTEIN SE develops customized products, systems and solutions for highly dynamic motion, maximum-precision positioning and smart networking for mechatronic drive technology.

Our highlights at SPS 2022: The new servo drive variant cyber® simco® drive 2 for mobile applications (AGV) and the cyber® distribution box for decentralized machine construction

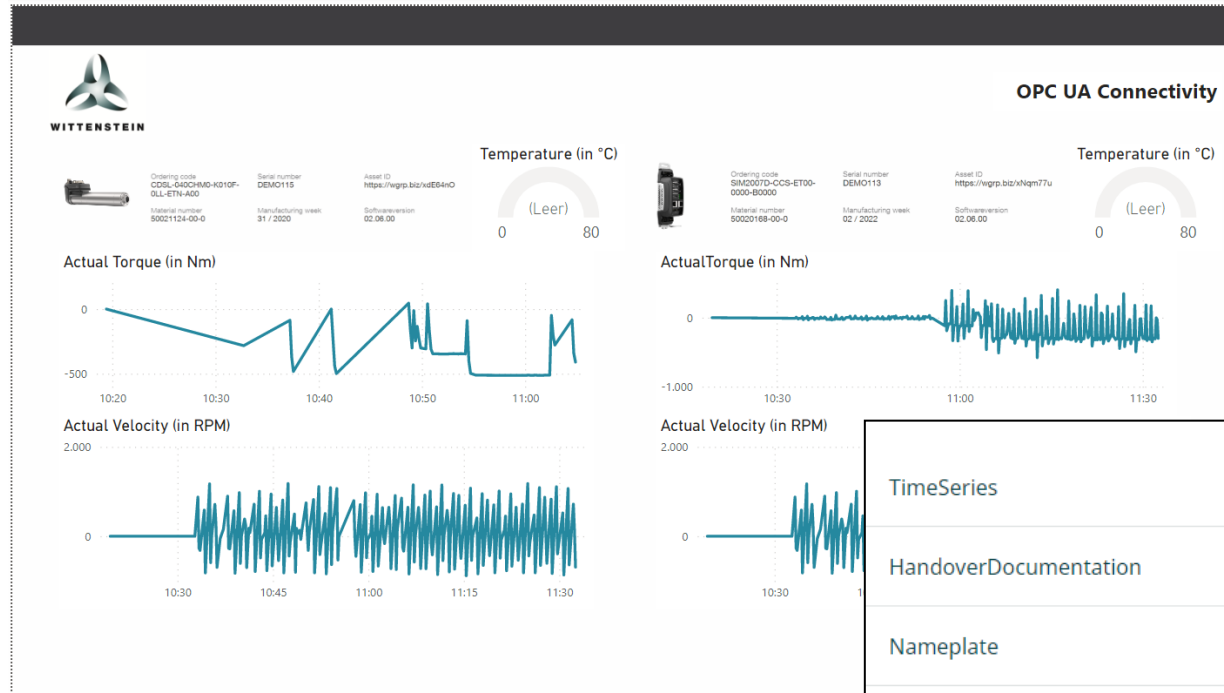
WITTENSTEIN | AAS - Vom Engineering zum Kunden | Bernd Vojanec | Proprietary Information

10.04.2024

6

WITTENSTEIN goes CADENAS

Innovation project in November 2022 on AAS



Link to CADENAS CAD data via Webcomponents API within the AAS

- Precisely fitting CAD data via scan of the nameplate
- AAS as a bridge between engineering and IoT data

The screenshot shows a list of data categories on the left, each with a right-pointing arrow, and corresponding CAD data links on the right:

- TimeSeries** → Document01: Collection of technical data (CAD/CAE, dimension sheet, data sheet) WITTENSTEIN, via CADENAS partcommunity. Includes an OPEN button and an information icon.
- HandoverDocumentation** → Document01: Collection of technical data (CAD/CAE, dimension sheet, data sheet) WITTENSTEIN, via CADENAS partcommunity. Includes an OPEN button and an information icon.
- Nameplate** → Document00: 3D STEP AP214 (*.stp) WITTENSTEIN, via CADENAS partcommunity. Includes an OPEN button and an information icon.
- ContactInformation** → Document00: 3D STEP AP214 (*.stp) WITTENSTEIN, via CADENAS partcommunity. Includes an OPEN button and an information icon.
- TechnicalData** → Document00: 3D STEP AP214 (*.stp) WITTENSTEIN, via CADENAS partcommunity. Includes an OPEN button and an information icon.
- MCAD/ECAD** → Document00: 3D STEP AP214 (*.stp) WITTENSTEIN, via CADENAS partcommunity. Includes an OPEN button and an information icon.

WITTENSTEIN goes CADENAS

Integration into the customer journey

■ ■ ■ ■ ■ Connectivity Product
■ ■ ■ ■ ■ Connectivity Digital twin



Our software solutions lead in different ways to an optimal and reliable drive selection in all axes.

Smart Services create maximum transparency within the machine and the Smart Factory. Smart Services from WITTENSTEIN analyze your gearbox and process data and actively increase the quality of machines and processes.

AAS in the customer journey

Requirements for the reuse and integration of data



- Content:**

 - Requirements and application data of the machine builder
 - Calculated utilization and service life of the products

Digital Twin requirements:

 - > 15 years referenceable and retrievable (persistence)
 - Access management



Cooperation with other initiatives, e.g. Factory-X "Collaborative Engineering" use case

AAS in the customer journey

Requirements for the reuse and integration of data



- Content:**
- Configuration incl. add-on parts
 - Technical data, handover documents and CAx data
 - Contact details
- Digital Twin requirements:**
- On-Demand generation to cover the wide range of variants

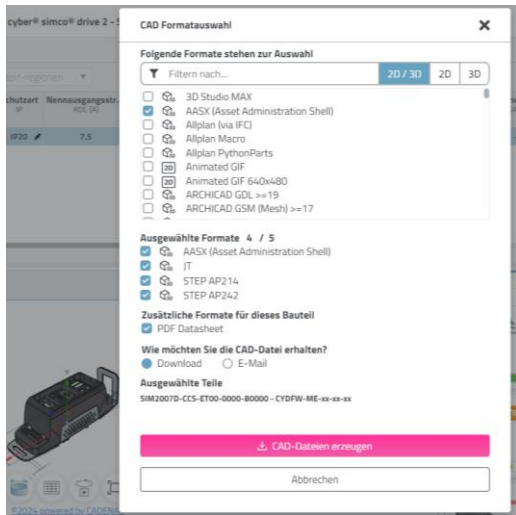


Cooperation with other initiatives, e.g. IDTA for standardized submodel for CAD

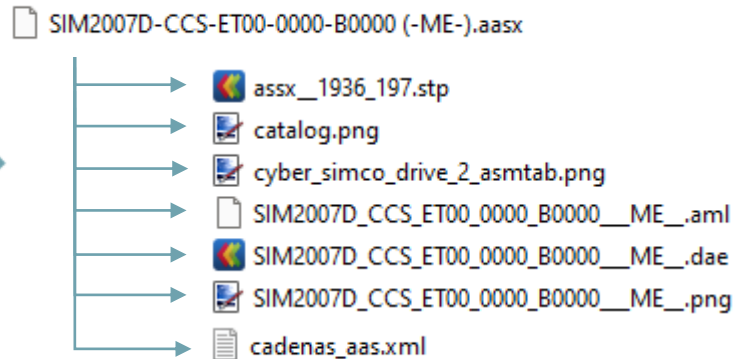
CADENAS AAS Implementation

AASX File Exchange Format

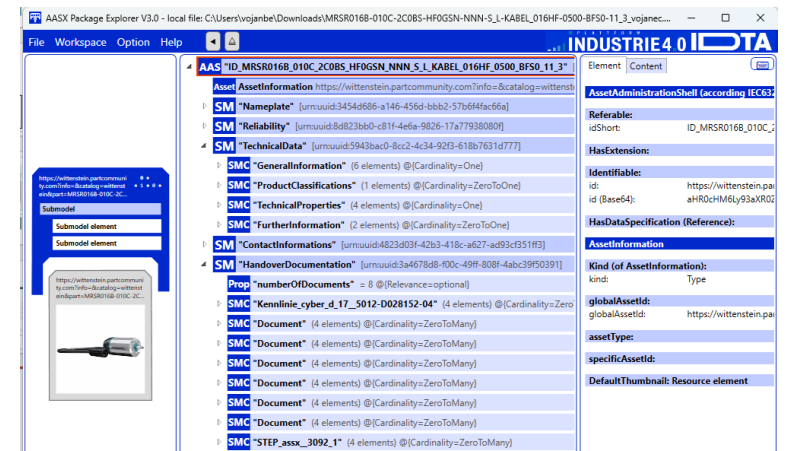
Catalog



AASX file exchange



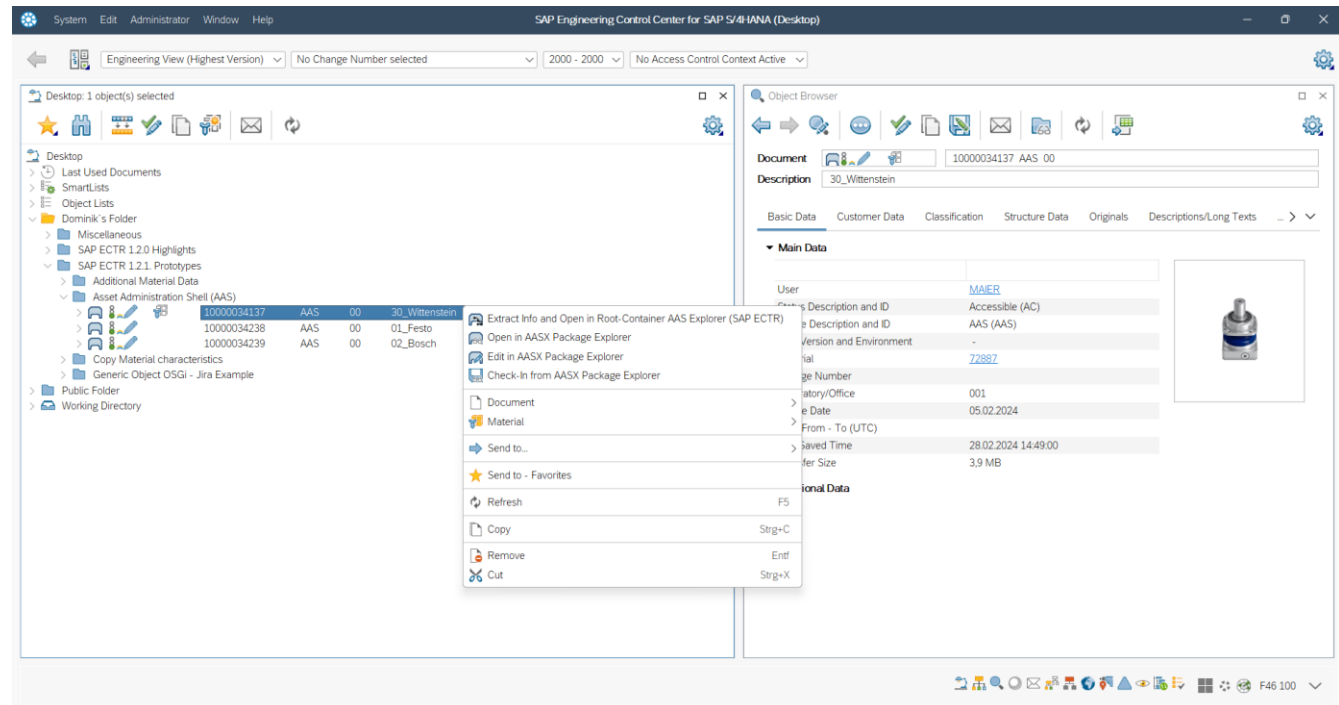
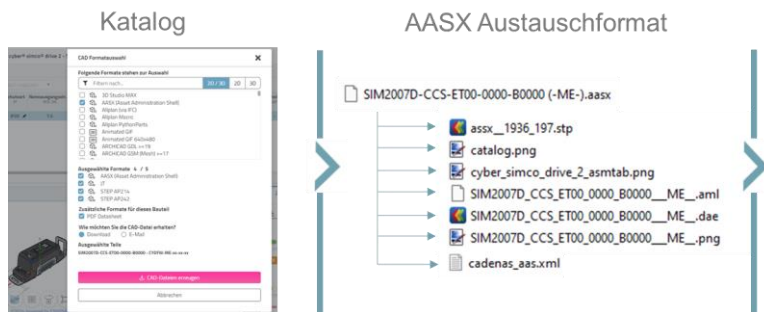
14.0-compatible applications



- AASX as "AAS ZIP file" can be generated and downloaded
- Identifying and technical data (submodels) can be read out as XML in accordance with the AAS standard
- Additional files (CAD, data sheet) are integrated in the AASX and referenced in the transfer documents submodel including metadata
- Multilingualism and integrated data semantics through ECLASS IRDIs

CADENAS AAS Implementation

AASX File – Increasing number of I4.0-compatible applications



*Prototype for AAS in SAP ECTR by DSC Software AG

CADENAS AAS Implementation

Deep Dive - Technical Data Submodel



IDTA 02003-1-2

Generic Frame for Technical Data for Industrial Equipment in Manufacturing


04 August 2022

SPECIFICATION

Submodel Template of the Asset Administration Shell

SM "TechnicalData" [b8e5a87f-3c01-4416-a895-8afe52ee7d6f]
<ul style="list-style-type: none"> <ul style="list-style-type: none"> SMC "GeneralInformation" (6 elements) @({Cardinality=One}) <ul style="list-style-type: none"> Prop "ManufacturerName" = Wittenstein @({Cardinality=One}) File "ManufacturerLogo" = /aasx/assets/catalog.png @({Cardinality=ZeroToOne}) MLP "ManufacturerProductDesignation" → cyber® simco® drive 2 @({Cardinality=One}) Prop "ManufacturerArticleNumber" = SIM2007D-CCS-ET00-0000-B0000 @({Cardinality=One}) Prop "ManufacturerOrderCode" = SIM2007D-CCS-ET00-0000-B0000 @({Cardinality=One}) File "ProductImage" = /aasx/assets/cyber_simco_drive_2_asmtab.png @({Cardinality=ZeroToMany}) <ul style="list-style-type: none"> SMC "ProductClassifications" (1 elements) @({Cardinality=ZeroToOne}) <ul style="list-style-type: none"> <ul style="list-style-type: none"> SMC "ProductClassificationItem" (3 elements) @({Cardinality=ZeroToMany}) <ul style="list-style-type: none"> Prop "ProductClassificationSystem" = eclass @({Cardinality=One}) Prop "ClassificationSystemVersion" = 11.1 @({Cardinality=ZeroToOne}) Prop "ProductClassId" = 27-02-31-01 @({Cardinality=One}) <ul style="list-style-type: none"> SMC "TechnicalProperties" (4 elements) @({Cardinality=One}) <ul style="list-style-type: none"> <ul style="list-style-type: none"> SMC "Dimensions" (3 elements) @({Cardinality=ZeroToMany}) <ul style="list-style-type: none"> Prop "Width" = 186.95 @({Cardinality=ZeroToMany}) Prop "Height" = 65.2172191839199 @({Cardinality=ZeroToMany}) Prop "Depth" = 51.4685415377942 @({Cardinality=ZeroToMany}) SMC "SECONDARY" (25 elements) @({Cardinality=ZeroToMany}) SMC "MAIN" (5 elements) @({Cardinality=ZeroToMany}) SMC "ECLASS Basic" (4 elements) @({Cardinality=ZeroToMany}) SMC "FurtherInformation" (2 elements) @({Cardinality=ZeroToOne})


- The technical data submodel (data sheet 4.0) contains all relevant technical properties of the product and can be read out as xml/json




WITTENSTEIN

cyber® simco® drive 2
IP20

3D Ansicht





Artikelnummer: SIM2007D-CCS-ET00-0000-B0000 (MN 50020168-00-0)
 Firmware: CYDFW-ME-xx-xx-xx (MN 50020933-xx-x)
 Anbauteile: -

Technische Daten:

Artikelnummer	SIM2007D-CCS-ET00-0000-B0000
Produktfamilie	cyber® simco® drive 2
Schutzart	IP20
Nennausgangsstrom / A	7.5
Feldbuschnittstelle	Ethernet-basiert
Verschlusskappe Stecker	-
Firmware	Multi-Ethernet
Schirmanschlussklemme	Ohne
Sicherheitskarte	-
Zwischenkreisspannung / Vdc	+ 12 ... 60
Nennstrom / A	7.5
Maximalstrom / A	15
Nennleistung / W	375
Maximalleistung / W	750
Kommunikation	EtherCat, PROFINET RT/IRT, EtherNet/IP CIP Sync, Sercos III, CANopen
Inbetriebnahme	USB

Page 1/2

WITTENSTEIN SE
Walter-Wittenstein-Straße 1
97660 Igersheim Germany

<https://cad-point.wittenstein-group.com>

Tel. +49 7931 493-0
Fax +49 7931 493-200

04.03.24 14:29

info@wittenstein.de
www.wittenstein.de

CADENAS AAS Implementation

Deep Dive – Handover Documentation Submodel



SM	"HandoverDocumentation" [b16c3f47-4c85-4c1e-bf5e-d5887a42852c]
Prop	"numberOfDocuments" = 4 @({Relevance=optional})
4	SMC "Document" (4 elements) @({Cardinality=ZeroToMany})
▷	SMC "DocumentId" (3 elements) @({Cardinality=OneToMany})
▷	SMC "DocumentClassification" (3 elements) @({Cardinality=OneToMany})
4	SMC "DocumentVersion" (15 elements) @({Cardinality=ZeroToMany})
Prop	"Language" @({Cardinality=OneToMany})
Prop	"DocumentVersionId" @({Cardinality=One})
MLP	"Title" → @({Cardinality=One})
MLP	"SubTitle" → @({Cardinality=ZeroToOne})
MLP	"Summary" → @({Cardinality=One})
MLP	"KeyWords" → @({Cardinality=One})
Prop	"StatusSetDate" @({Cardinality=One})
Prop	"StatusValue" @({Cardinality=One})
Prop	"OrganizationName" @({Cardinality=One})
Prop	"OrganizationOfficialName" @({Cardinality=One})
Ref	"RefersTo" @({Cardinality=ZeroToMany})
Ref	"BasedOn" @({Cardinality=ZeroToMany})
Ref	"TranslationOf" @({Cardinality=ZeroToMany})
File	"DigitalFile" = /aasx/assets/assx_1936_197.stp @({Cardinality=OneToMany})
File	"PreviewFile" = / @({Cardinality=ZeroToMany})
Ref	"DocumentedEntity" @({Cardinality=ZeroToMany})
▷	SMC "Document" (4 elements) @({Cardinality=ZeroToMany})

HandoverDocumentation

Datasheet



Datasheet
WITTENSTEIN

[OPEN](#)



OperatingManual



OperatingManual
WITTENSTEIN

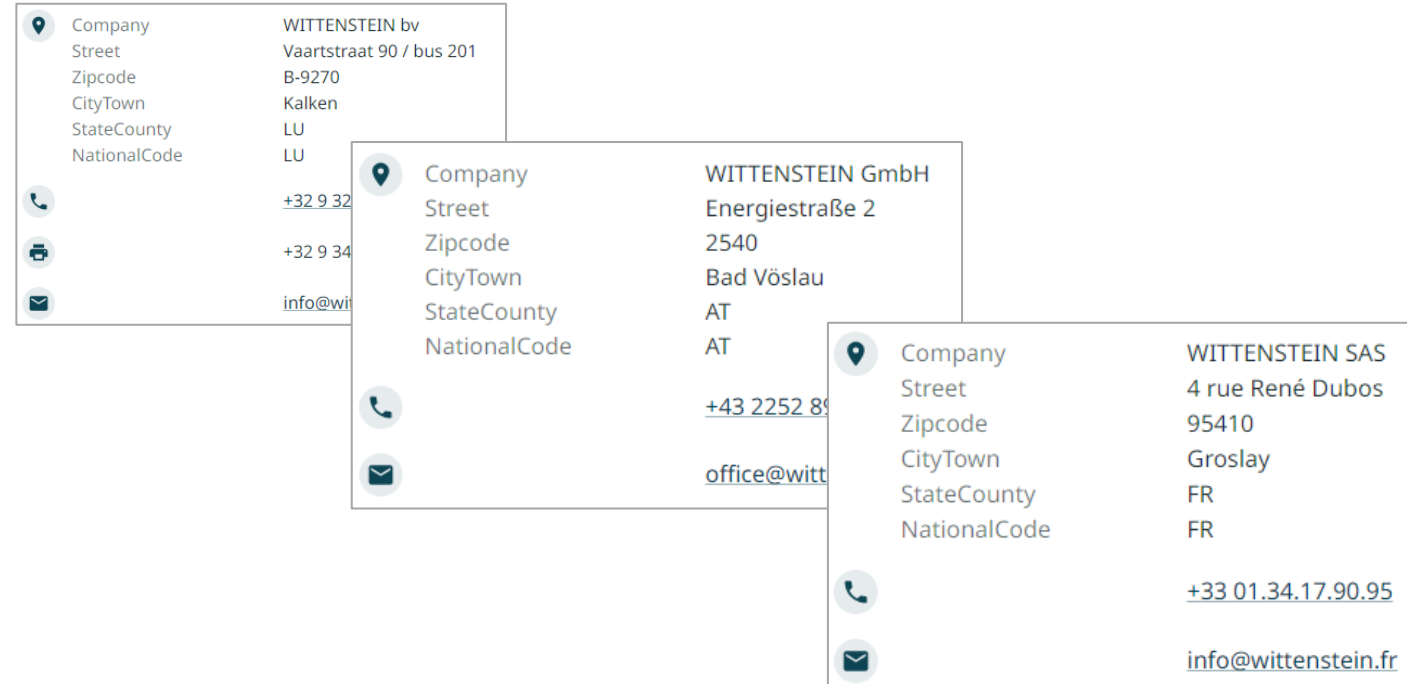
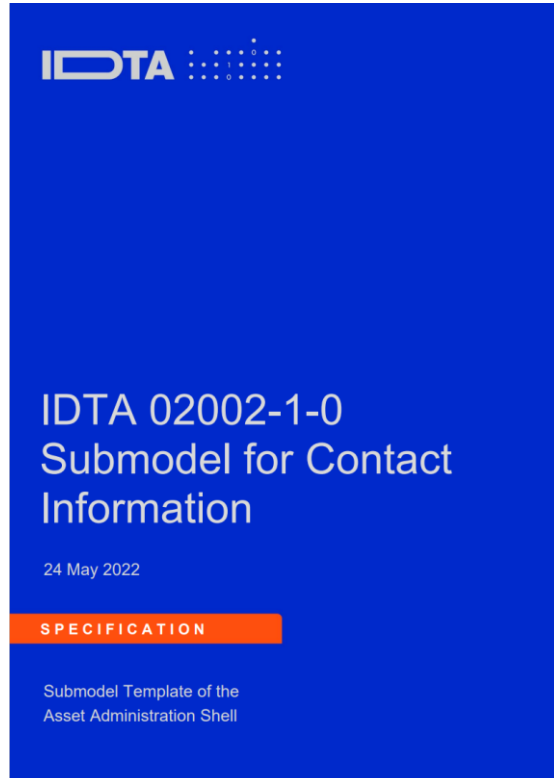
[OPEN](#)



- The transfer documents submodel is used for the standardized exchange of documentation for an asset. Based on VDI2770, the metadata for a file is particularly relevant here

CADENAS AAS Implementation

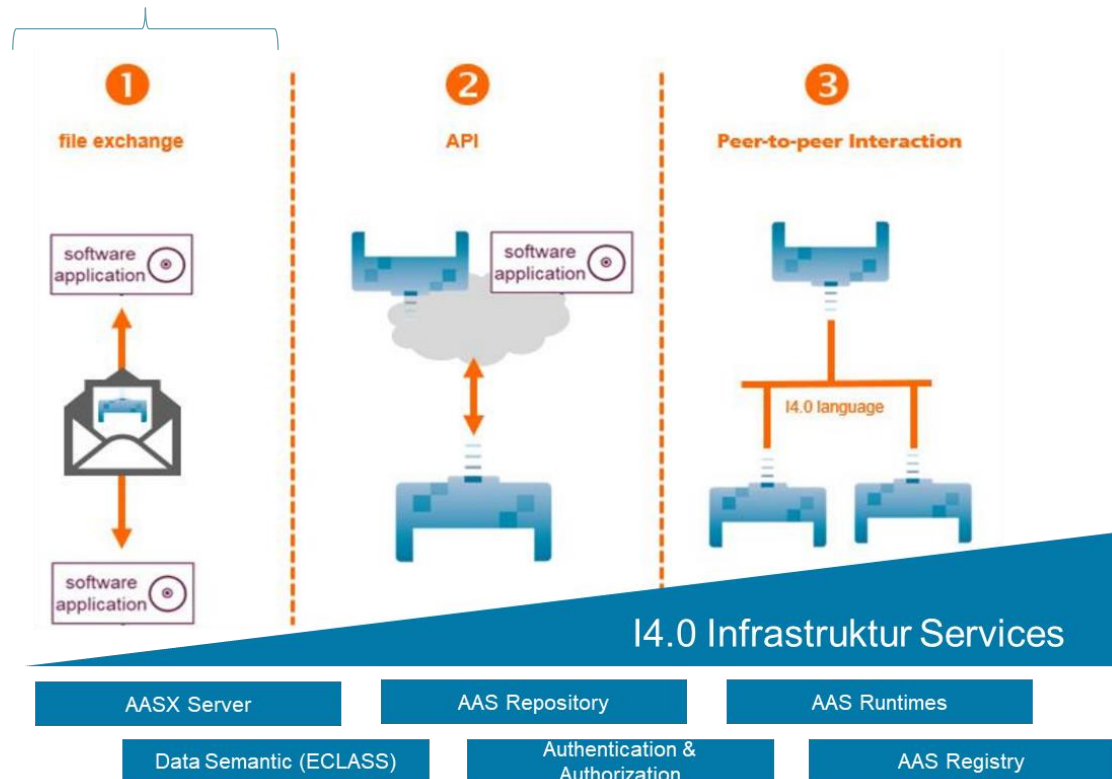
Deep Dive – Contact Information Submodel



- The contact information submodel is used for the standardized exchange of contact information

CADENAS AAS Implementation

Further implementation forms & infrastructure services for AAS



- 1 Static Content**
Offline data exchange via AASX, XML, Files ...
- 2 Dynamic Content**
API for online data exchange via HTTP REST, OPC UA, MQTT, ...
- 3 Skills and AI**
Peer-to-peer interaction via I4.0 interaction processes such as autonomous provider processes

AAS in the customer journey

Requirements for the reuse and integration of data



Engineering tools



Dimensioning and analysis of a complete drive train



Suitable gearbox suggestions based on your application data



Retrieving product information and CAD files

Smart Services in use



cynapse® Monitor



cynapse® Connect

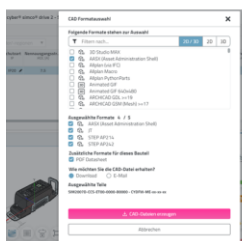


cynapse® Analyze

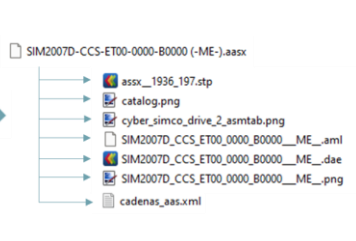


Customized product information and services with just one scan via the Service Portal

Katalog



AASX Austauschformat



AAS Repo für Nutzungsphase



Content:

- Type-Data from Engineering
- Manufacturing and production data (transaction data)
- (lot-) usage data and after-sales services

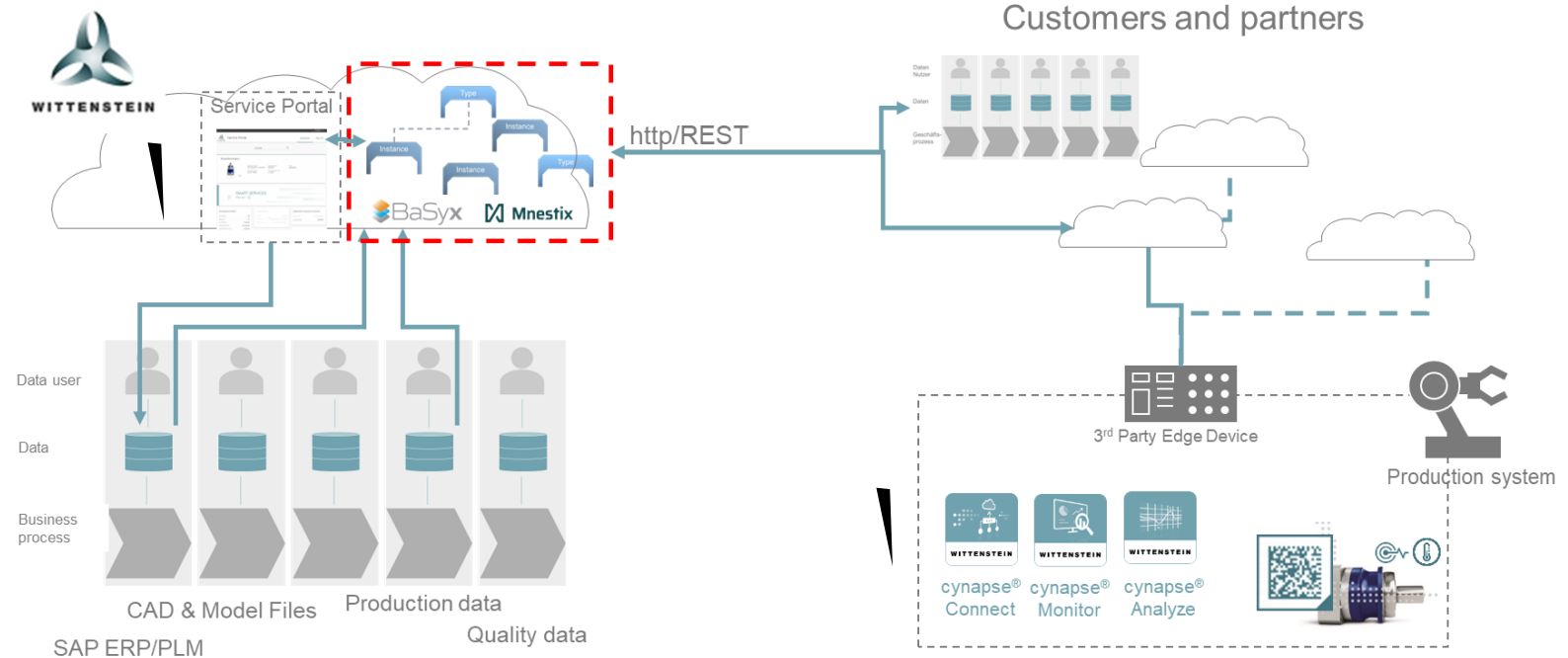
Digital twin requirements:

- Interactive Digital twin (APIs)

WITTENSTEIN AAS Implementation

Cloud Repository

- AAS Repository provides standardized access to twins of product instances
- Continuous sync of company data into the repository
- Use Cases:
 - Smart Service parameterization
 - After-Sales services



WITTENSTEIN AAS Implementation

Additional touchpoints in after-sales



Erweiterte Daten

Messprotokoll

Eingangskontrolle

- ✓ Wicklungswiderstand U-V / V-W / W-U 0.54 Ohm
- ✓ Linearität MB1 0.15 %
- ✓ Linearität MB2 0.18 %
- ✓ Fabrikations-Nr. Kraftsensor 6157185
- ✓ Fabrikations-Nr. Spindel 2240110

Measurement and quality data according to customer requirements



MAC-Adresse 00:25:33:C0:34:CF

Dokumentation

- Betriebsanleitung Sprache wählen ▾
- MotionGUI V 3.1.0
- MotionGUI V 2.6.2

Soft- and Firmwareupdates



Ersatzprodukt anfragen

Bestehendes Produkt LUC+400-0511-02 / SN: 5191

Ersatz für







- Schmierstoffgeber
- Schmierstoffkartusche

Precisely fitting spare and consumable parts

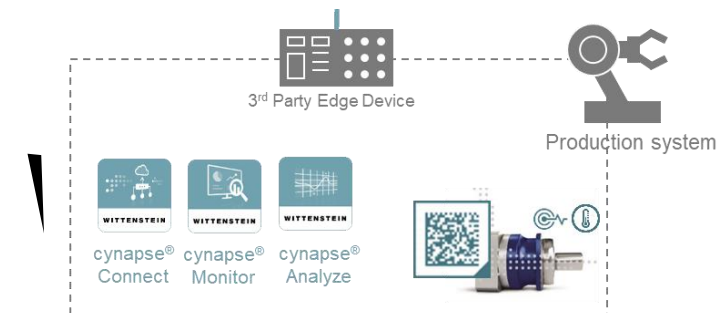
WITTENSTEIN AAS Implementation

AASX File – for "offline" parameterization of digital services

The screenshot shows the 'Asset Administration Shell' page in the cynapse® Connect portal. The page title is 'Asset Administration Shell'. A light blue message box states: 'Currently, there is no Asset Administration Shell available for the following assets: https://wgrp.biz/pcb14, Test115. You can upload the Asset Administration Shell manually or restore the internet connection to automatically synchronize the Asset Administration Shell.' Below this, a table lists three assets:

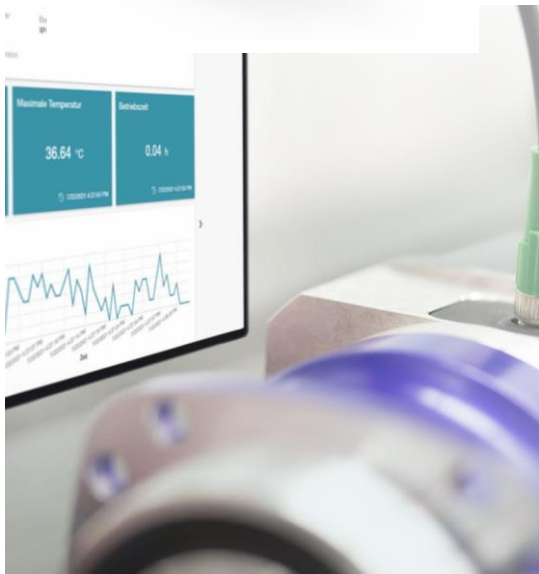
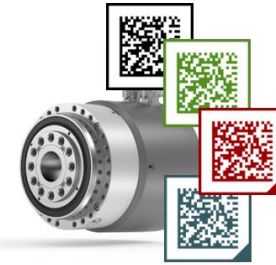
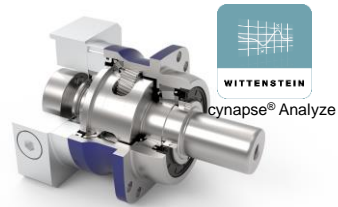
Asset Id	Source	File size	Action
 Asset Id: https://wgrp.biz/x3BA7hz	Synchronized	181.75 KB	
 Asset Id: https://wgrp.biz/xNi7Tzv	Synchronized	120.84 KB	
 Asset Id: https://wgrp.biz/x123456	Uploaded by user	141.03 KB	

At the bottom of the table area, there is a button: 'Upload Asset Administration Shell'.

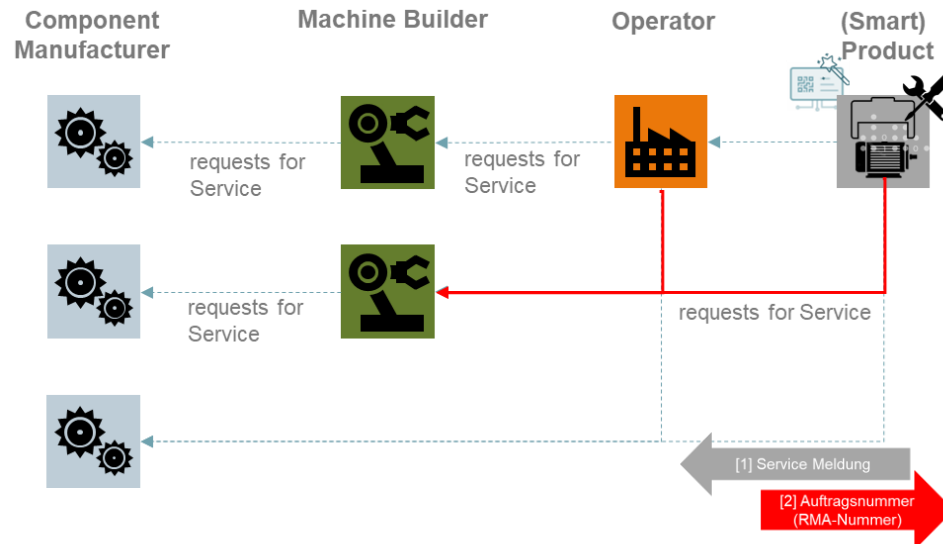


WITTENSTEIN AAS Implementation

Smart Products & Services



Life file & parameterization of smart services



Customized contact and service processes



Summary

- AAS is not just an additional exchange format in engineering, but also ensures Industry 4.0 connectivity throughout the entire product life cycle
- The cooperation with CADENAS gives us the freedom to further develop the AAS instances in a targeted manner
- Next Steps CADENAS
 - Collection of use cases for further expansion stages
 - AAS v3 update
 - Further submodels (e.g. 3D)

