Create your Digital Twin in days, not months.

Use case of the ISO 10303 PLM module, reference data and IoT storage

Practical examples of Digital Twin using the ISO 10303 repository
- o The Mountain Bike
- o The Crane

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Jotne

ARROWHEAD TOOLS
KYKLOS 4.0
CHANGE2TWIN
Supported by advanced EU H2020 projects
DAIS
DRYADS

Agenda

Use case of the ISO 10303 PLM module, reference data and IoT storage

- The standard – what does ISO/TC 184/SC 4
- What is PLM and how it relates to ISO 10303
- ISO 10303 PLM Module capabilities
- PLM in the Digital Twin context
- 3-click approach for Digital Twin implementation
- Use case demonstrations (use of the ISO 10303 PLM Module)
  - Mountain bike
  - Offshore crane

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What does ISO/TC 184/SC 4

A better world through better data

- The ISO committee for **Industrial Data** wins top ISO award

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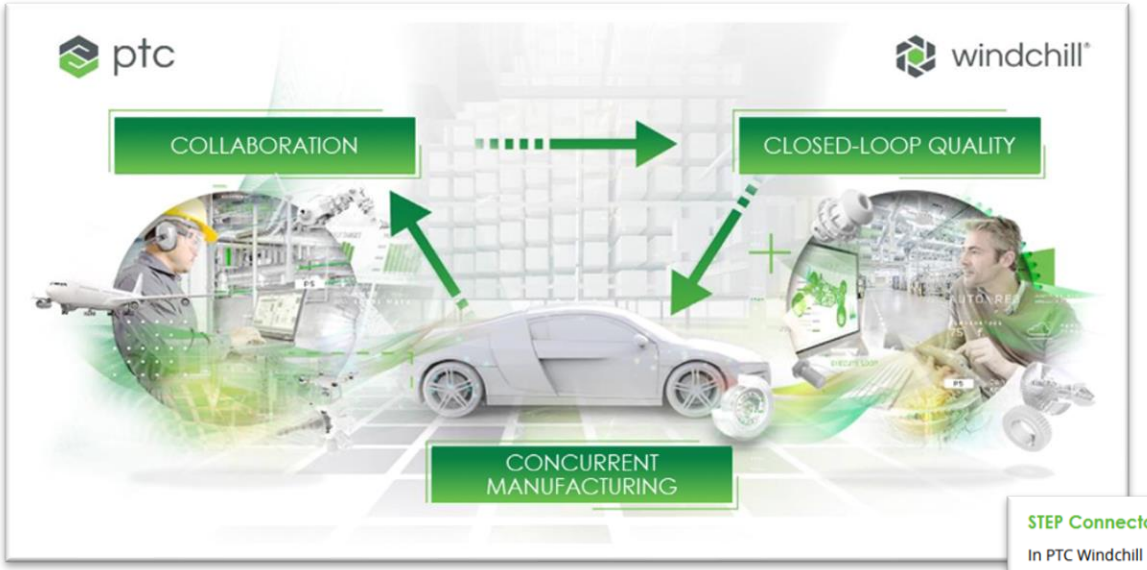
What is PLM / how it relates to ISO 10303



For example: PTC Windchill

- **Product data management**
- **Change and configuration management**
- **Requirements management**
- **BOM management**
- **Product variability management**
- **Manufacturing process management**
- **…**

ISO 10303 STEP Connectors

STEP Connectors for AP214 and PLCS

In PTC Windchill 10.2 M010, the STEP connector allows for the exchange of product data that is managed in Windchill in ISO 10303 STEP format.

Product Information

Product	PDM & Process Solutions PTC Windchill
Product / Module	PTC Windchill PDMLink
Version	10.2
Datecode	M010
Product Functional Area	Integrations
User Interface Location	
Processes, Initiatives, and Best Practices	Design & Manufacturing Outsourcing Detailed Development Product Support Analysis and Planning

Benefits and Description

The PTC Windchill STEP connector allows for the exchange of product data that is managed in Windchill in ISO 10303 STEP format. The STEP connector has closely ingrained EXPRESS schema support. EXPRESS is an information data modeling language that is used to define the schema for all the ISO10303 STEP application protocols. The connector supports the ascii (P21) or XML (P28) file formats. The connectors provide support for AP214 and PLCS standards.

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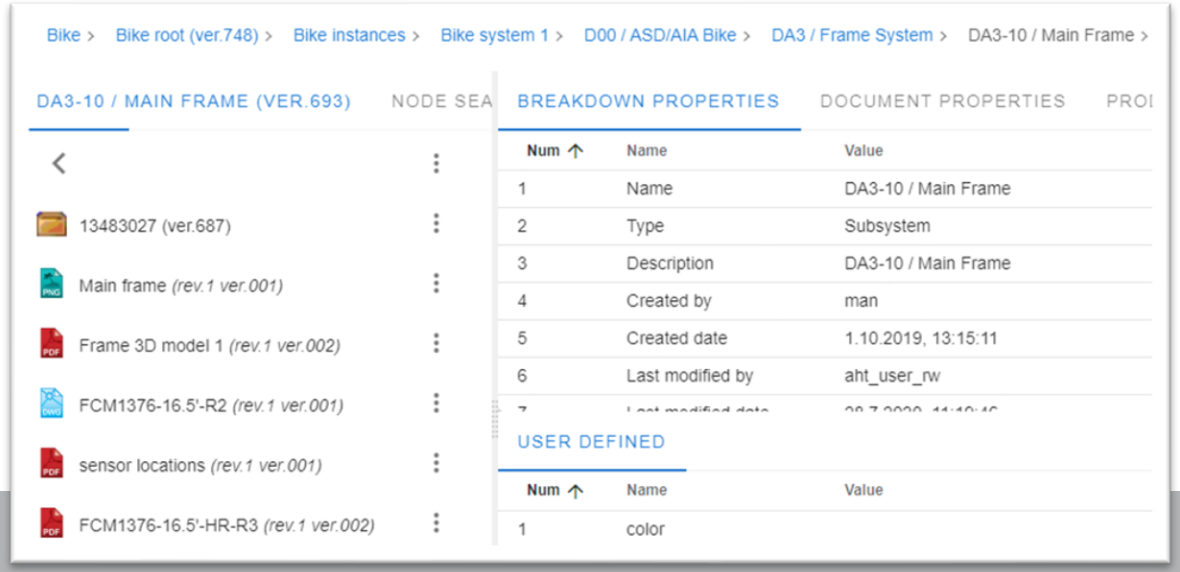
ISO 10303 PLM Module capabilities

- **ISO 10303 repository supports product data exchange, sharing and archiving**
  - **Connected to large PLM vendors, like PTC Windchill**
- **Includes a built-in Reference Data Library (ontologies)**
- **Information is organized in Breakdown Structures that consist of Breakdown Elements**
  - **Properties and Documents are assigned to Breakdown Elements**
- **Breakdown Structures are automatically created by uploading ISO 10303 STEP files (AP239, AP242 etc.)**



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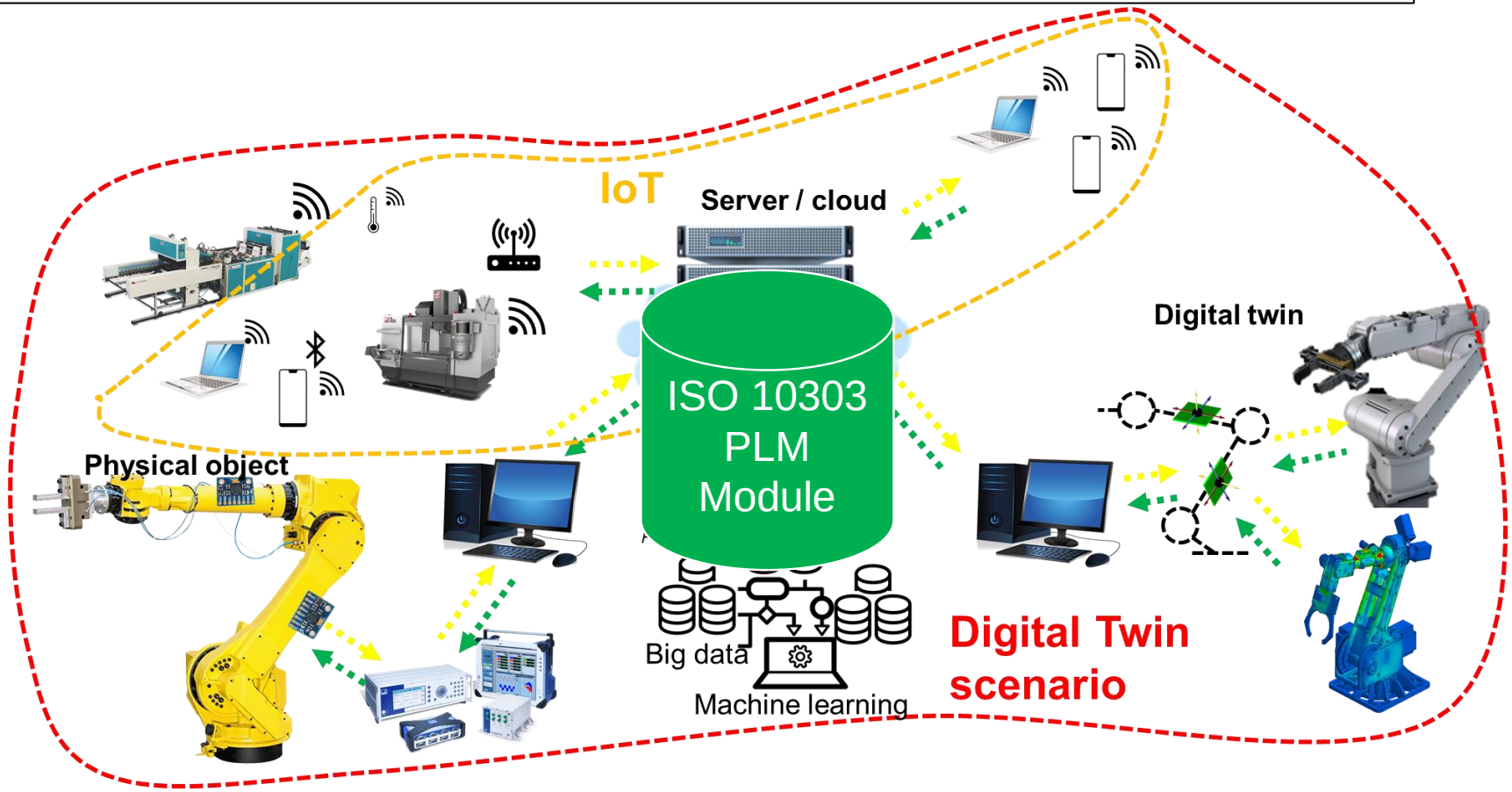
PLM and Digital Twin

- **PLM manages product lifecycle data**
- **A Digital Twin needs to store aspects of an operational product**

=> PLM enables support for many types of Digital Twins



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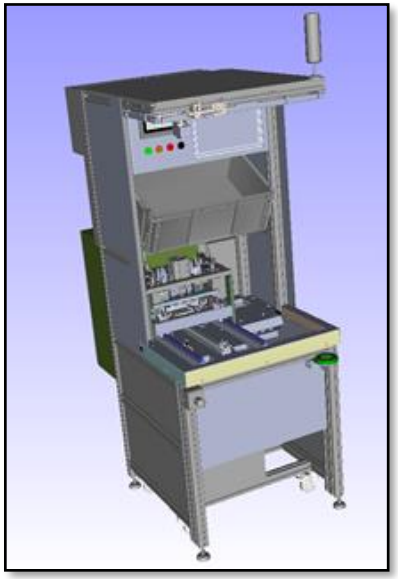
Examples of use cases

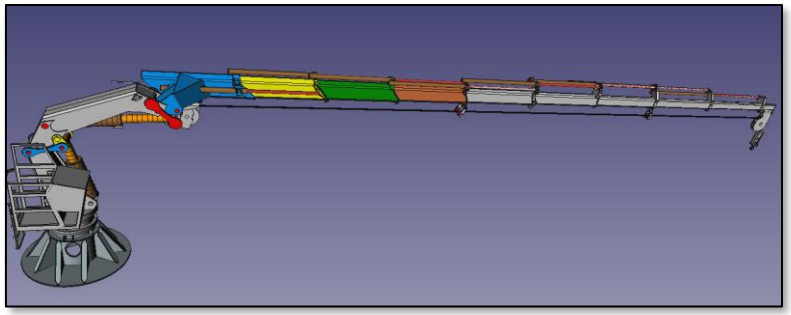
Mountain bike

Manufacturing



Lathe

Offshore crane



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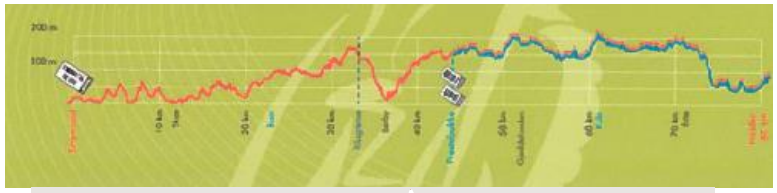
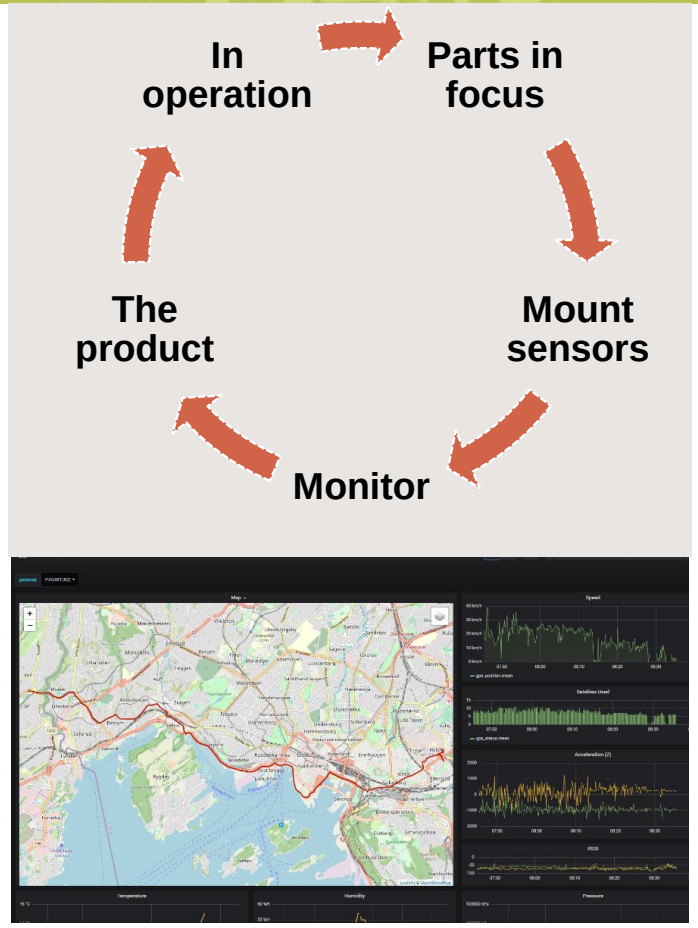
Mountain bike use case





Internet and 4G gateway

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3-click approach to a Digital Twin

1 Import CAD

2 Mount sensors

3 Configure IoT

Click #1: STEP (AP239, AP242 etc.) data import

CAD-model

STEP-file

ISO 10303 PLM Module

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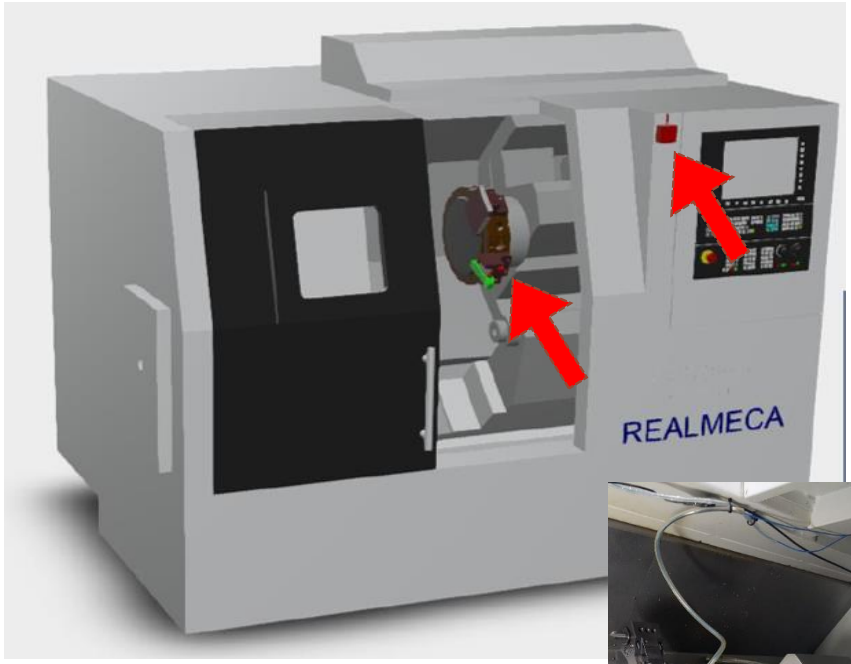
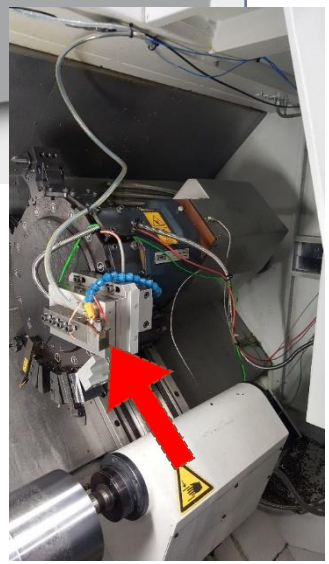
Click #2: Mount sensors

The bike has 3 sensors with 12 data streams.





The lathe has 11 sensors.

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Click #3: Configure IoT

Learn the details on Wednesday:

SENSORS

GATEWAY

CLOUD

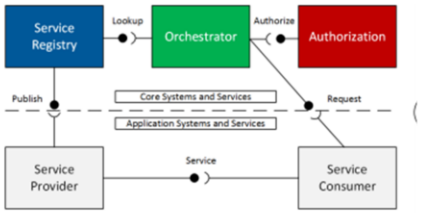
THE SOLUTION FINAL OUTCOME

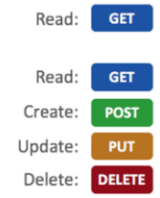
AHT IoT FRAMEWORK

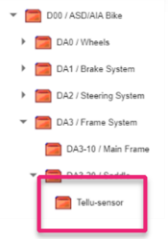
REST SERVICES

PLM STANDARDS

ARROWHEAD TOOLS







ISO®

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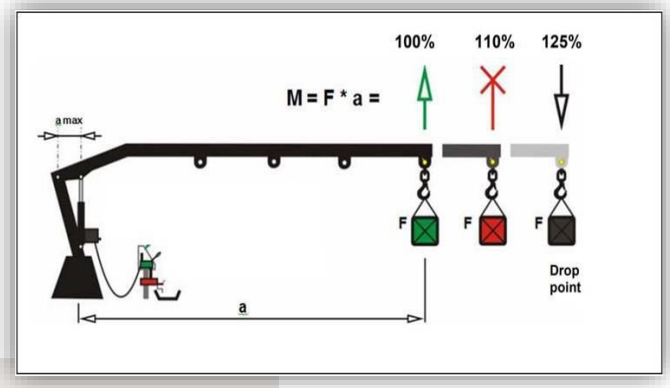
Offshore crane use case



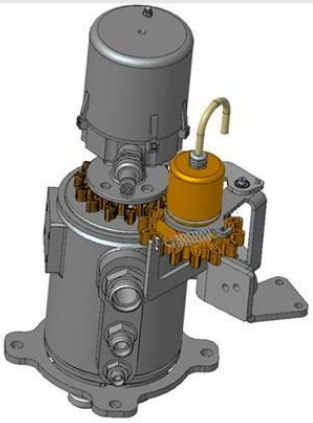
In operation

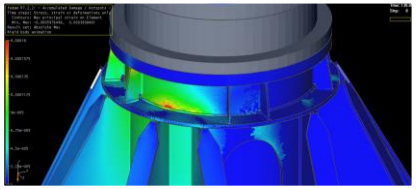
Parts in focus

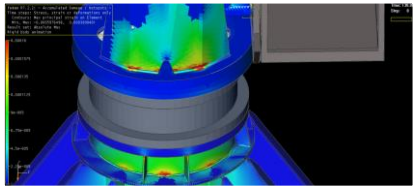
Mount sensors

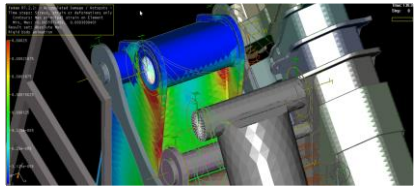
Monitor

The product









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Demonstration scope (1)

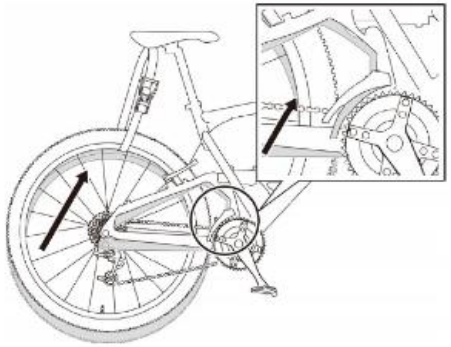
Maintenance tasks and task break down

BREAKDOWN PROPERTIES DOCUMENT PROPERTIES

- DA0 / Wheels
  - DA0-10 / Front wheel
    - Maintenance tasks
      - T00001 (Troubleshooting)
      - T00002 (Replace valve)
      - T00003 (Replace tube)
      - T00004 (Replace tire)
      - T00005 (Replace wheel)
      - T00006 (Adjust spoke)
  - DA0-20 / Rear wheel

TECH TIPS

Bicycles with suspensions are positioned differently between when a rider is off the bicycle and on the bicycle. By referring to the illustration, perform installation and SIS adjustment while seated on the bicycle.

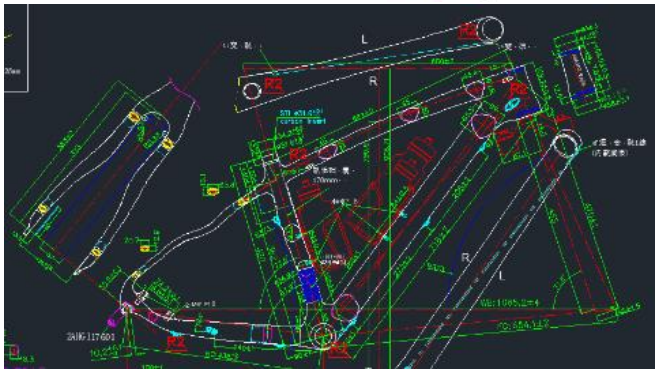


Check visually the condition of the tire to identify any damage on it.

ARROWHEAD TOOLS

3D CAD/CAE Models

Drawings



Performance

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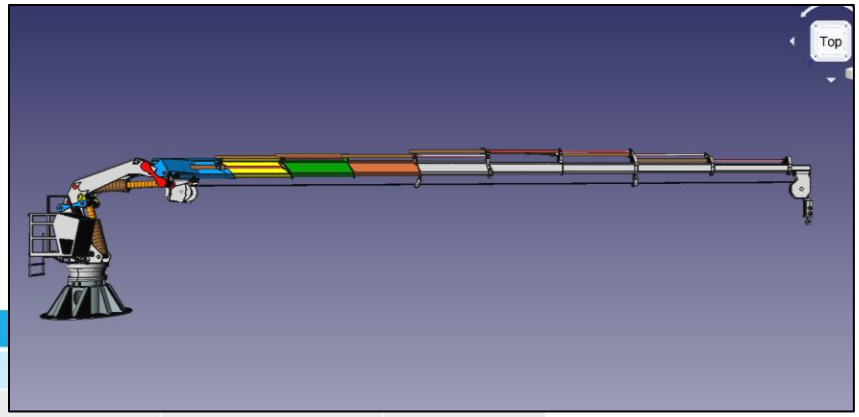
Demonstration scope (2)

- Load STEP file
- Assign the 10 sensors
- Browse through bike and crane data



Sensor Type	Data type and units					
USB_GPS						
altitude list	altitude (m)	vspeed (km/hr)				
position list	Speed (km/hr)	track	gpstime_diff	latitude	longitude	
RUUVITAG						
13483027	ax, ay, az (m)	battery	Humidity (%H)	Pressure (hPa)	rssi	Temperature (°C)
218991	ax, ay, az (m)	battery	Humidity (%H)	Pressure (hPa)	rssi	Temperature (°C)
Modbus						
HA-KA-400-700	Main Boom Angle HA-U702 (degrees)	Outer Boom Angle KA-U703 (degrees)	Outer Boom Extension KA-U704 (meter)	Slewing Angle KS-U802 (degrees)	Cylinder pressure KS-U409.1, HA-U411.1 (bar)	
IMU						
P4GW1002_IMU	acceleration (acx, acy, acz): (m/s^2)	angular velocity (gyrox, gyroy, gyroz): (r/s)	magnetic field strength (magx, magy, magz) (mtesla)			

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Summary

- Focus of this presentation was data management for digital twins
  - This is part of a 3-click approach to Digital Twin implementation
- A standard data representation is recommended
  - To avoid vendor lock-in
  - To control scalability and reusability of your digital twin
  - To enable long-term data archiving and retrieval
- ISO/TC 184/SC 4 “Industrial Data” provides such as standard data representation by ISO 10303, STEP
- The repository is now ready for use by Artificial Intelligence and Machine Learning
- The third click, IoT configuration, will be presented on Wednesday

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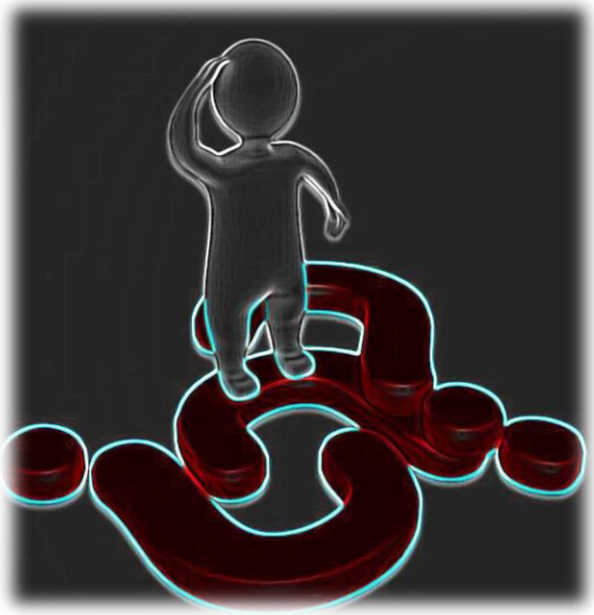

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