

IOT DRIVEN ENGINEERING

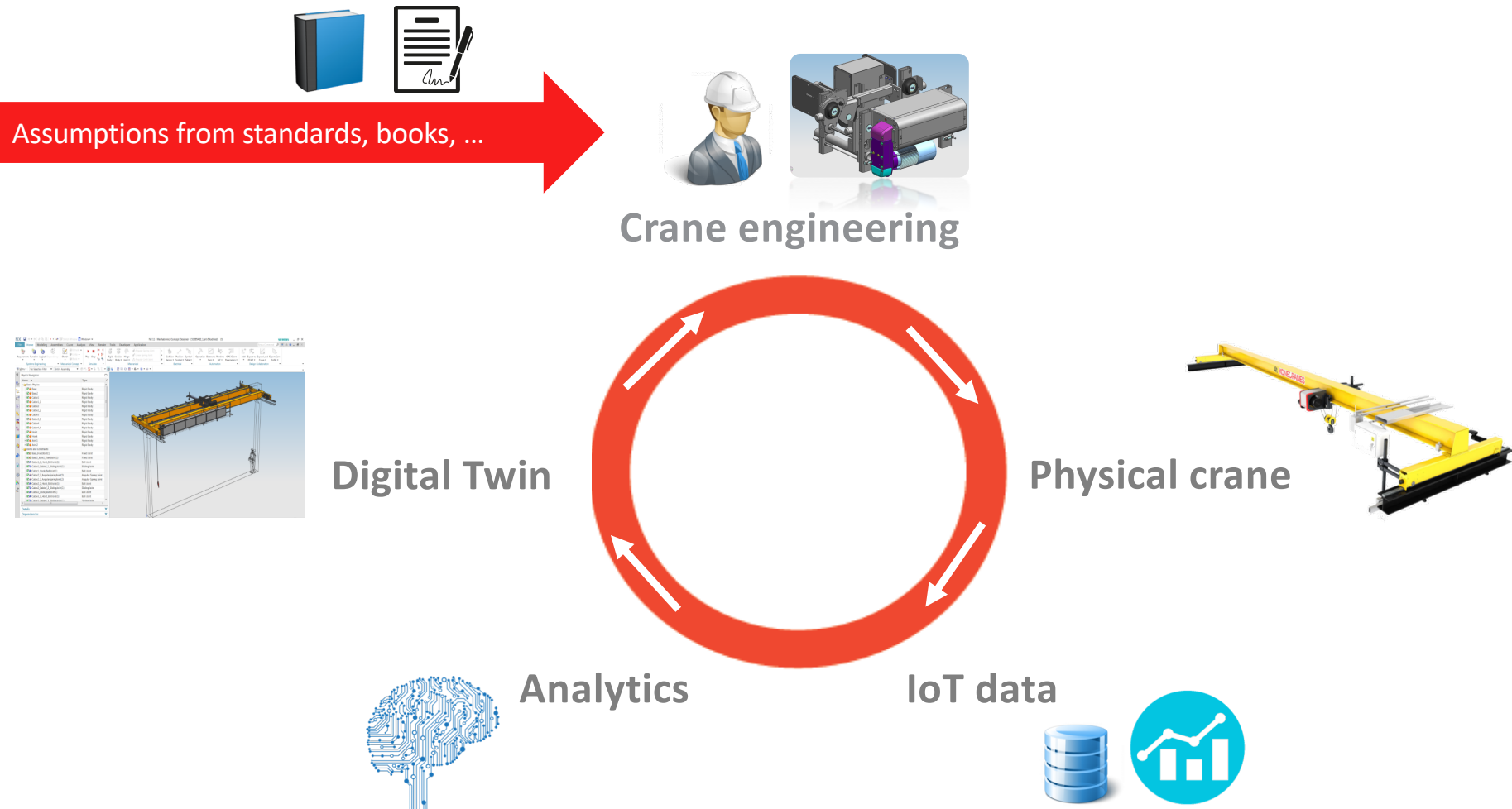
18.1.2019
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KONECRANES
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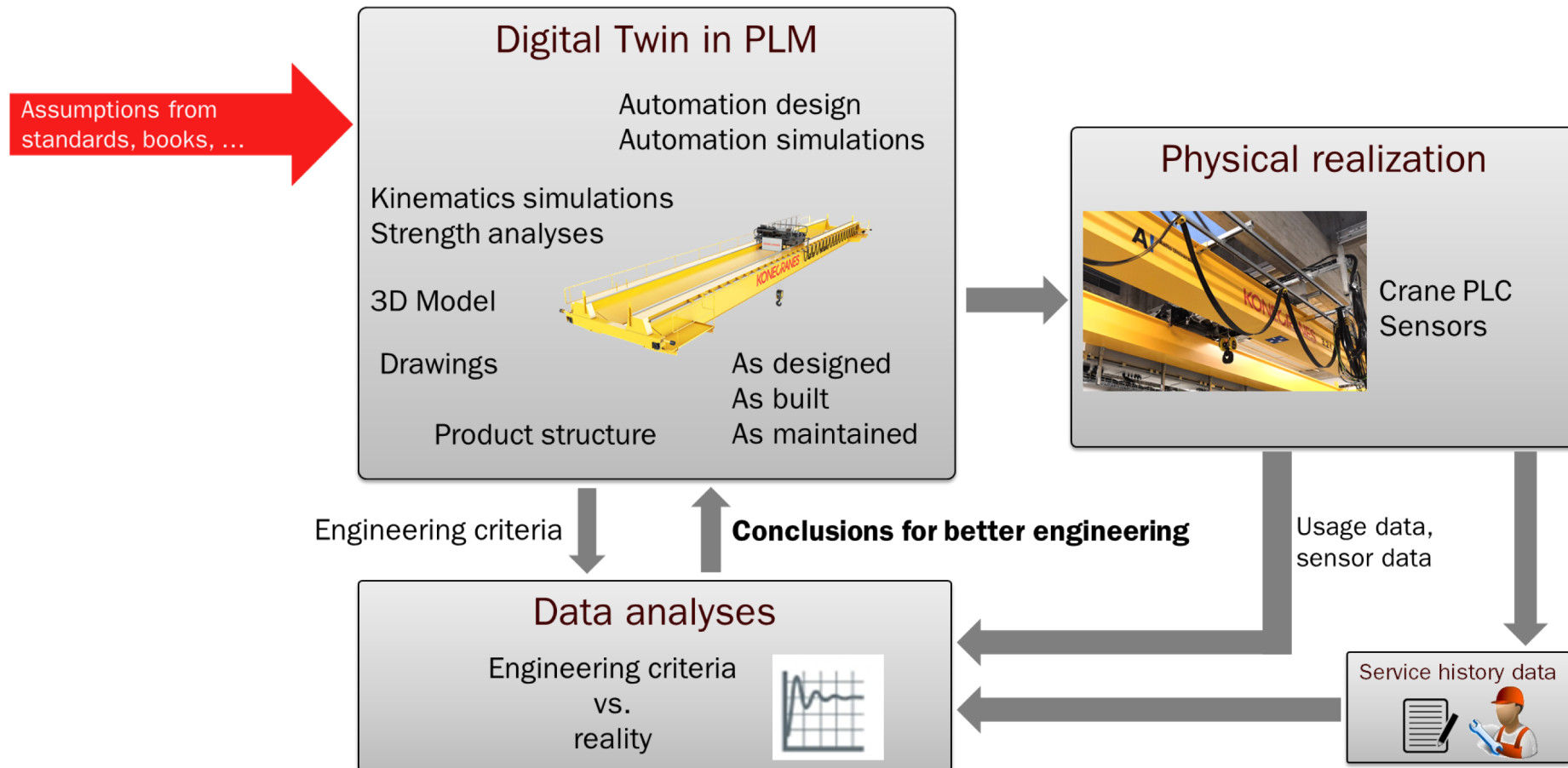
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ENGINEERING ASSUMPTIONS CHALLENGED BY IOT DATA



DIGITAL TWIN IN PLM AS A NEW APPROACH



PLM EXTENDED TOWARDS REAL WORLD

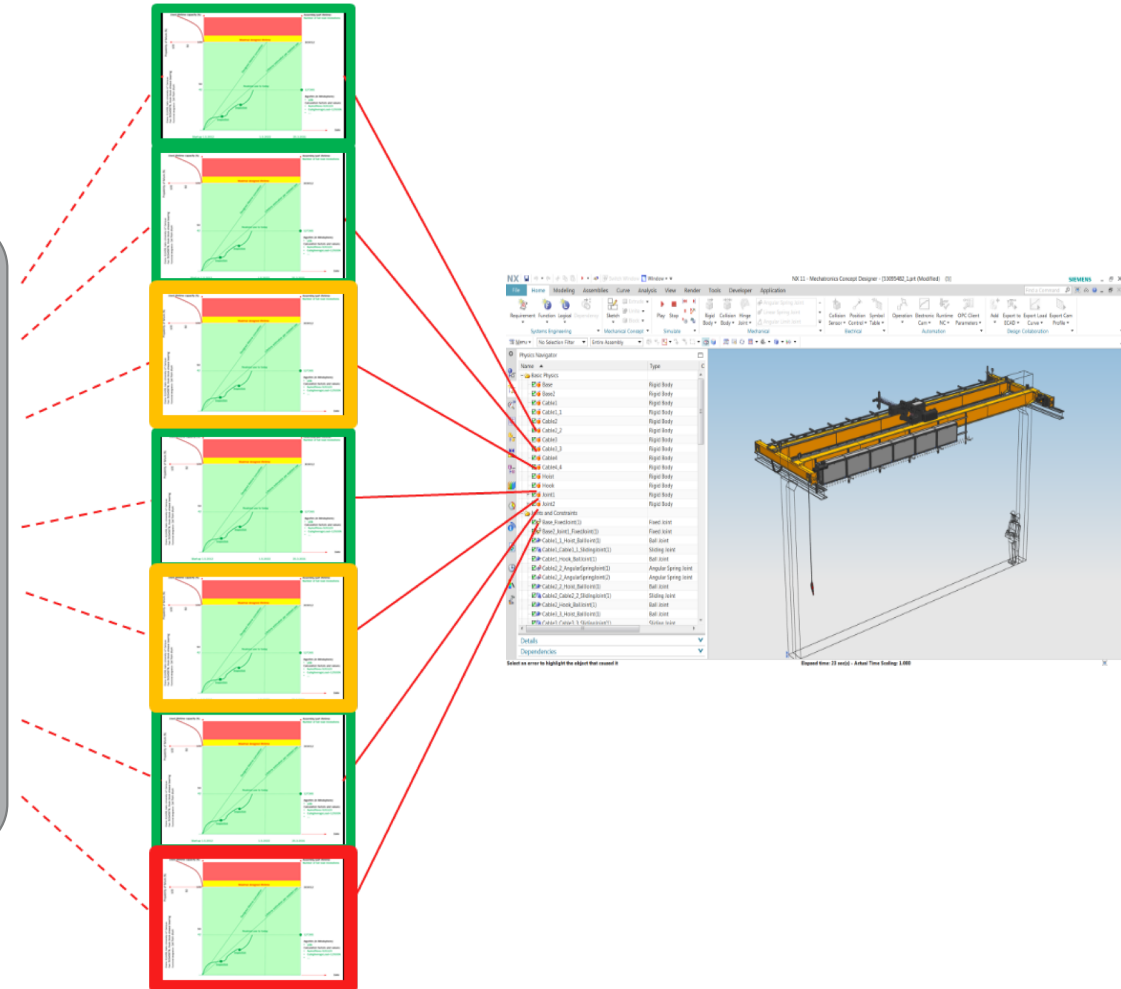


IoT data:
Usage &
condition
monitoring

Service data:
Faults & repairs
of components

Analyses:
Engineering
criteria
Vs.
Usage &
service
history

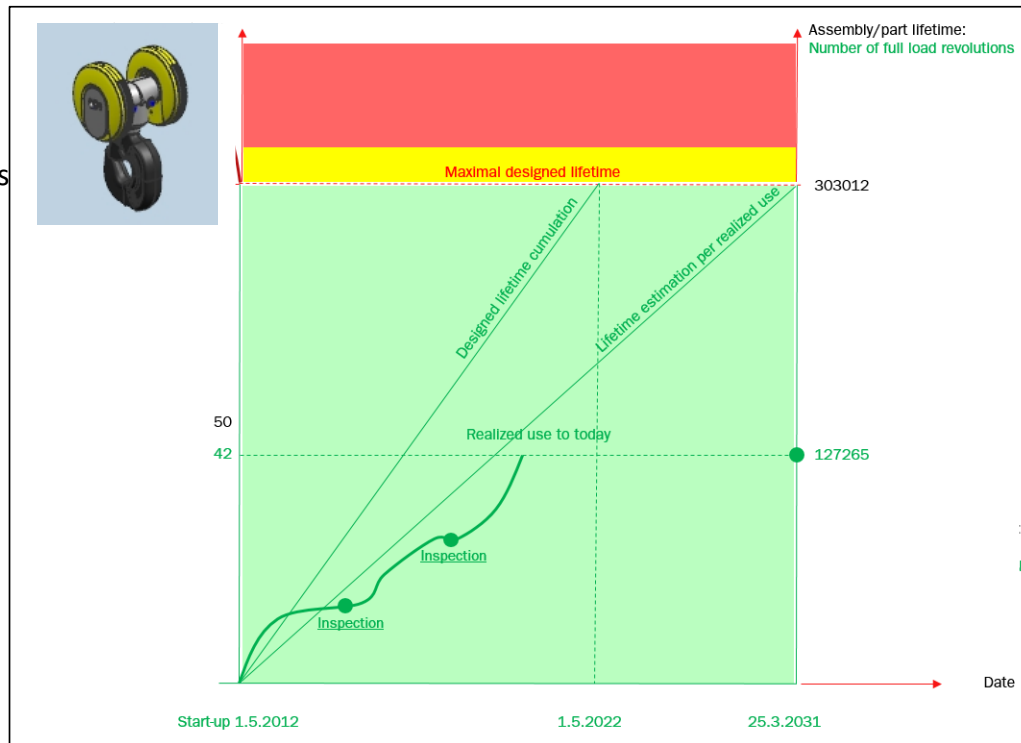
Analyzed component information from
Service and Engineering viewpoints



ANALYZED COMPONENT INFORMATION

Service view

- Maintenance tasks & inspections based on Twin analyses
- Lifetime estimations for components
- “Digital Twin based maintenance”

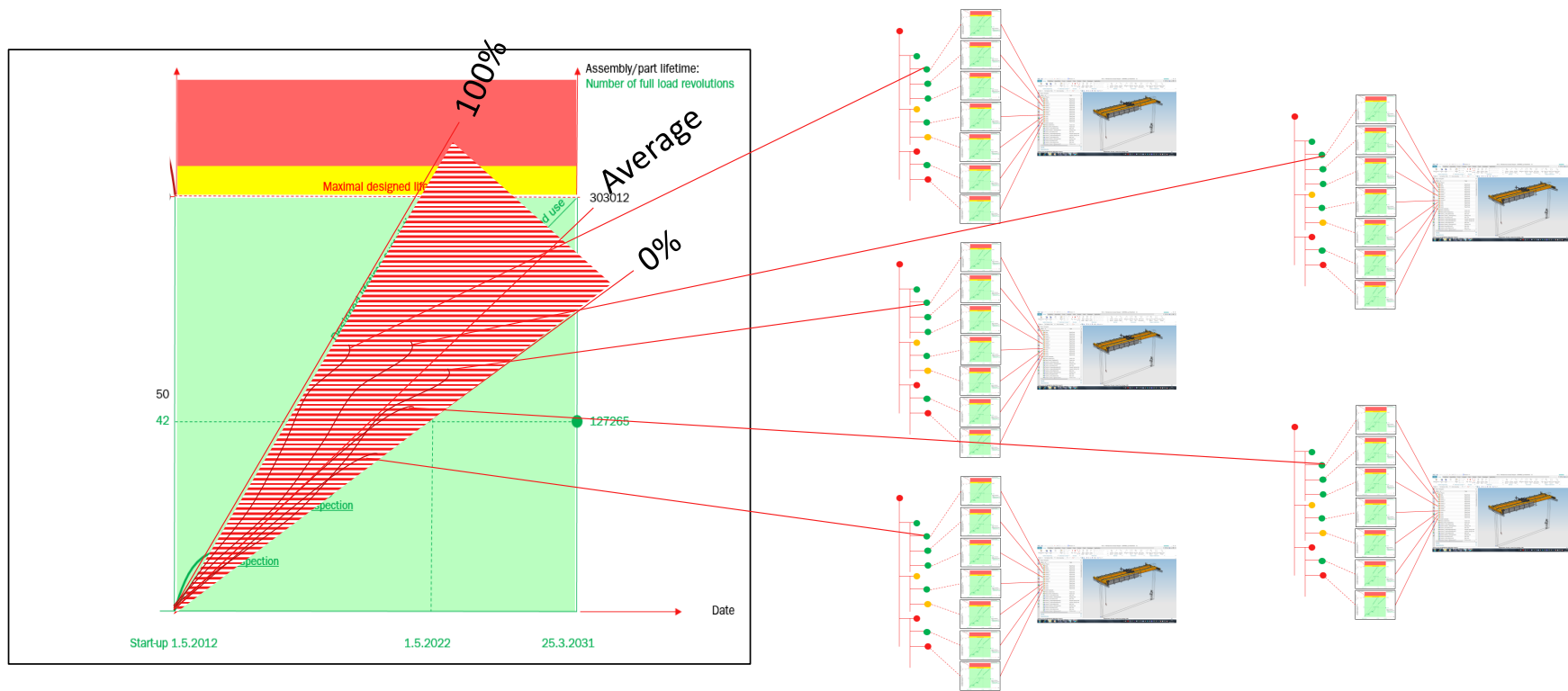


Engineering view

- Comparison of design calculations and realized use
- Information about weak points of products

→ Optimized dimensioning & selection of components

STATISTICAL VIEW TO SIMILAR COMPONENTS



- Find similar parts in cranes on field
- Equalize data from different cranes
- Analyse statistically

USE CASE



Sensored raw data



F_L
Load forces

Z Vertical position

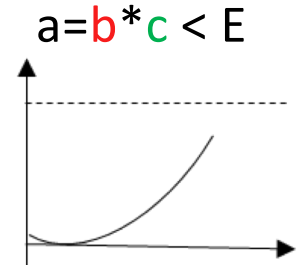
Processed info
from raw data

Rope forces

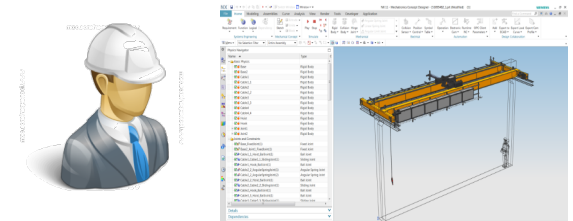
$F_{r1} F_{r2} F_{r3} F_{r4}$



Algorithms
analyzing and
reporting
bearing status &
estimation



CONCLUSIONS



- IoT and Digital Twins give a chance to make a cultural revolution in engineering
 - From assumptions to real world information – design to fit purpose – no over or under engineering
 - Connects engineering and service more tightly together (real usage and condition based service)
 - Collected facts from field to support discussion between machine manufacturer and customer
 - Continuous learning by utilizing field data in every day engineering and service work
- Challenges
 - Raw data varies from asset to another and is not always similarly formalized
 - Currently available data does not fit directly to existing engineering formulas as such
 - Customers are used to refer to international standards
 - Machine manufacturer needs to have a lot of analyzed knowledge from the field to renew approach