LinkedDesign

Project Overview

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European Commission

SEVENTH FRAMEWORK PROGRAMME

Consortium

Project Objectives

Linked engineering & M@nufacturing platform
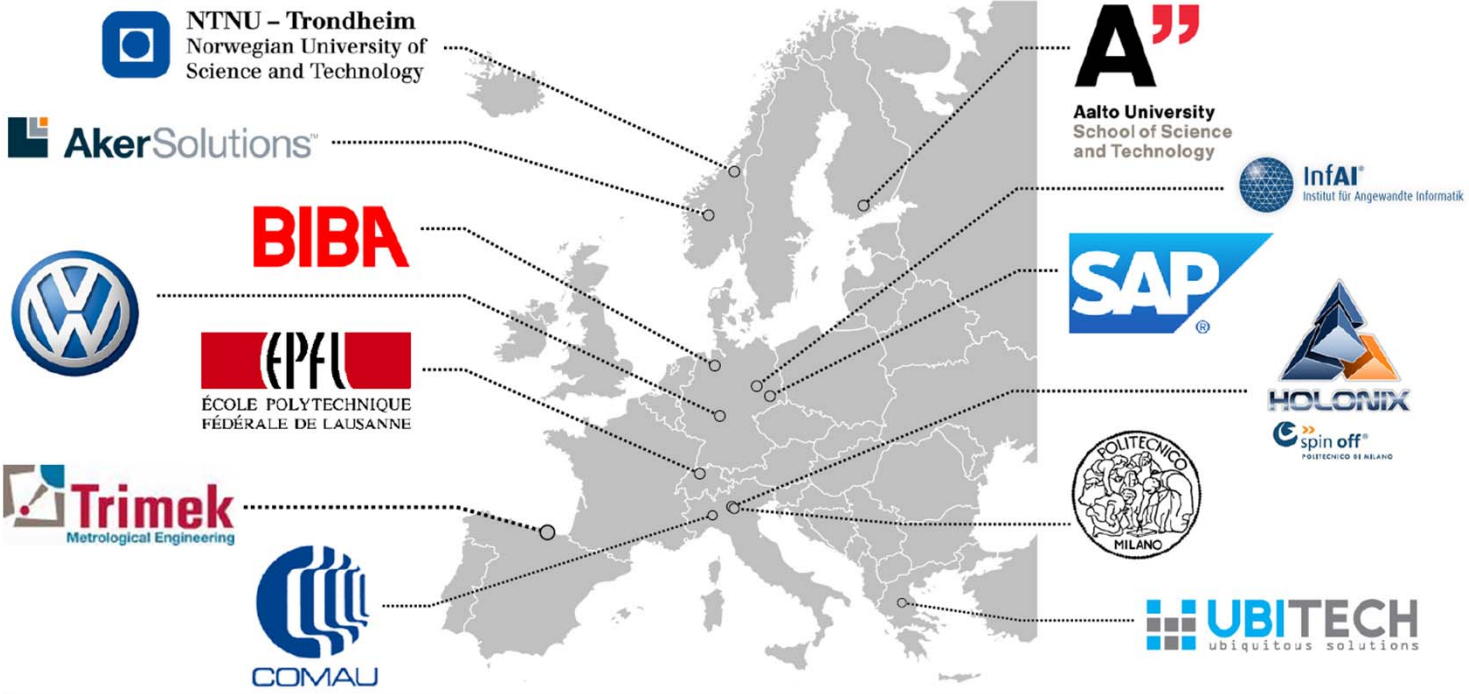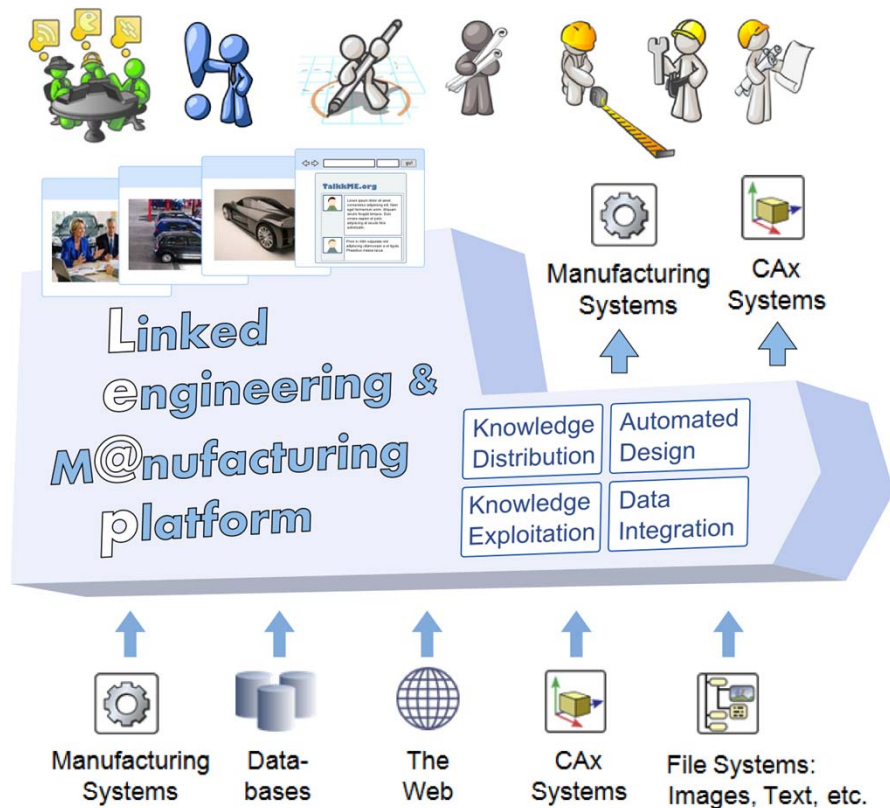
Data Federation

- Relevant information, across trusted sources in the product lifecycle
- Format, location and time independent

Context-driven access and analysis

- Collaborative charting and simulations
- Integrated information analysis

User collaboration

- Extension of lean engineering principles
- Collaboration workbench for effective internal and external collaboration

Feedback into existing systems

- Tight connection to the federated systems
- Push-back of enriched information

Use cases

Application Prototypes

Manufacturing Design based on Plant Lifecycle Costs

Knowledge Reuse and Collaboration in Automated Design for Offshore Engineering

Metrology-driven Manufacturing in the Automobile Industry

Demon-strators

Lifecycle Design Optimisation

Automated Design with Virtual Obeya

Manufacturing Quality Control

LEAP Architecture

o **Service Oriented Architecture**

<table>
<tr>
<td rowspan="4" style="writing-mode:vertical">Linked Engineering & Manufacturing Platform</td>
<td>External Tools Integration:
SharePoint, StreamWork, MS OneNote, Word Press, etc.</td>
<td colspan="2">Virtual Obeya: Analytics, Visualization and Collaboration Widgets
Knowledge Analysis and Navigation, Lifecycle Data Analysis, Chart-based Reporting, etc.</td>
<td rowspan="3" style="writing-mode:vertical">LinkedDesign Ontology</td>
</tr>
<tr>
<td colspan="3">LEAP Services: Knowledge Exploitation and Automated Design Services
LCC/LCA Service, Semantic Reasoner, KBE Services, Sensor Data Analysis, etc.</td>
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<tr>
<td></td>
<td colspan="2">Data Services: Knowledge Linking and Data Integration
SmartLink Infrastructure, Link Generator, Semantic Mediator, LinkedDesign Ontology Services, etc.</td>
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<tr>
<td colspan="4">Data Sources: Manufacturing Systems   Databases   The Web   CAx Systems   File Systems: Images, Text, etc.</td>
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LEAP Architecture

- **LEAP Instantiations for each of the use cases**
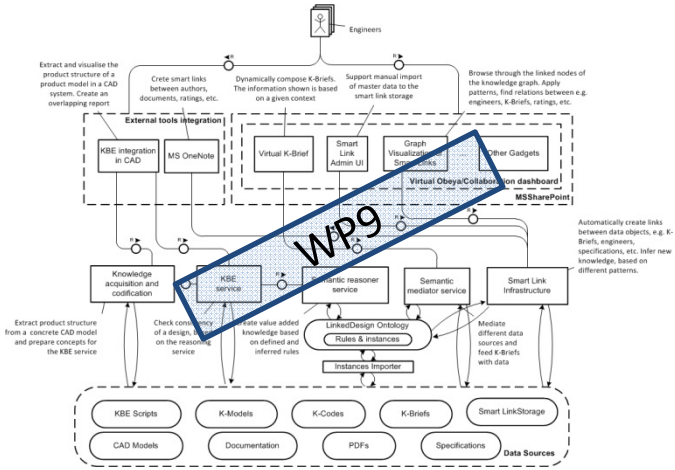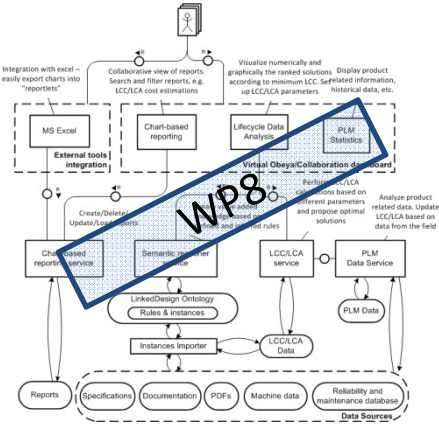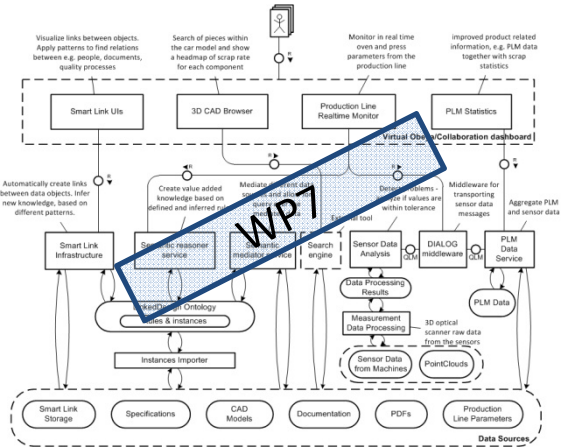
Quantum Lifecycle Management (QLM)

- o **QLM standardization process major milestone**
  - • The standard proposal has been finalized and submitted for review by the Open Group.
- o **Kary Främling (AALTO)**
  - • Nominated as Chair of the QLM- WG Open Group
- o **Jacopo Cassina (HOLONIX)**
  - • Nominated as Vice-Chair of the QLM- WG Open Group

COMAU Case

COMAU: global supplier of industrial automation systems and services (automotive manufacturing sector)
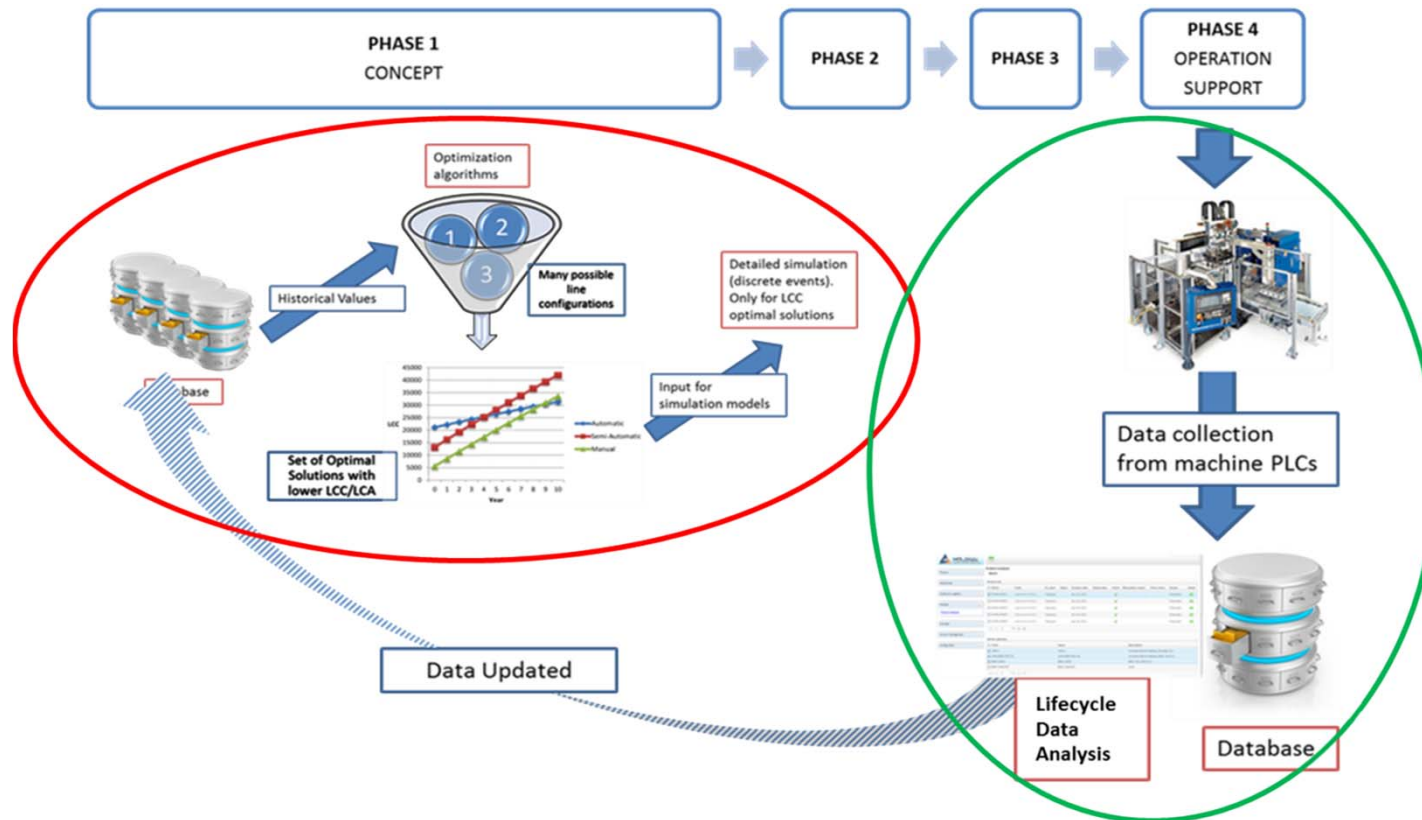
COMAU

SMART**BOX** COMAU

Trend: customers evaluate suppliers in terms of **"product life cycle" performances**
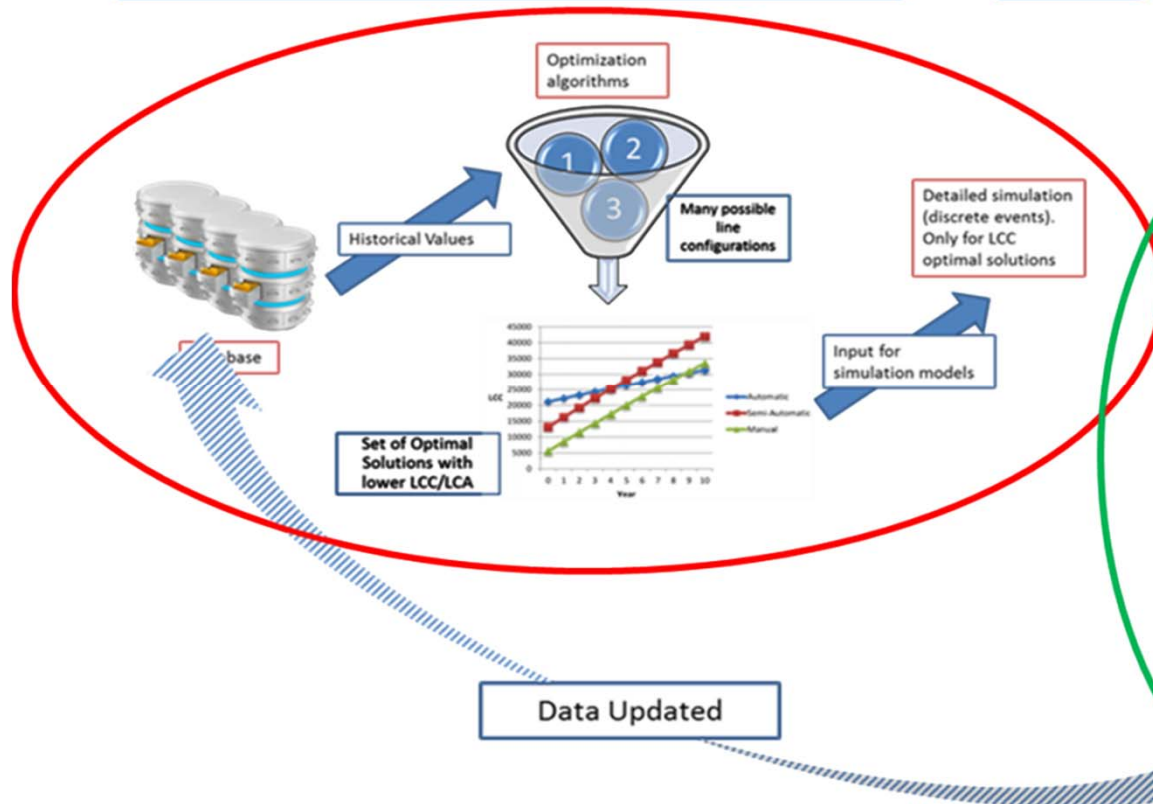
COMAU Case

Linked Design tools:

➤ Improve the **effectiveness and efficiency** of designers

➤ Increase the **knowledge on life-cycle** of their products

COMAU Case

Optimization algorithms and simulation models:

➢ Analysis of a **wide range of alternatives**

➢ Identification of **the best life cycle and customer oriented solution**

COMAU Case

Tools for the collection of data from the field:

➢ Increase the **accuracy of company database**

➢ Improve the **effectiveness and the efficiency of the design phase**

➢ Improve the **life cycle evaluation**

PHASE 3 → PHASE 4 OPERATION SUPPORT

Data collection from machine PLCs

Lifecycle Data Analysis

Database

COMAU Case

Middle 2015
Data Collection &
Evaluation+LCC in Comau
Assembly Line Proposal

Summer-Winter 2015
Data Collection &
Evaluation+LCC:
Pilot Station → Machining Line

Beginning of 2016
Data Collection & Evaluation +
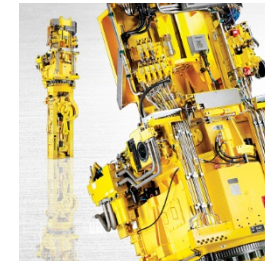LCC in Comau Assembly &
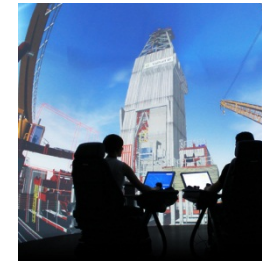Machining Line Proposal

Summer-Winter 2014
Data Collection &
Evaluation+LCC:
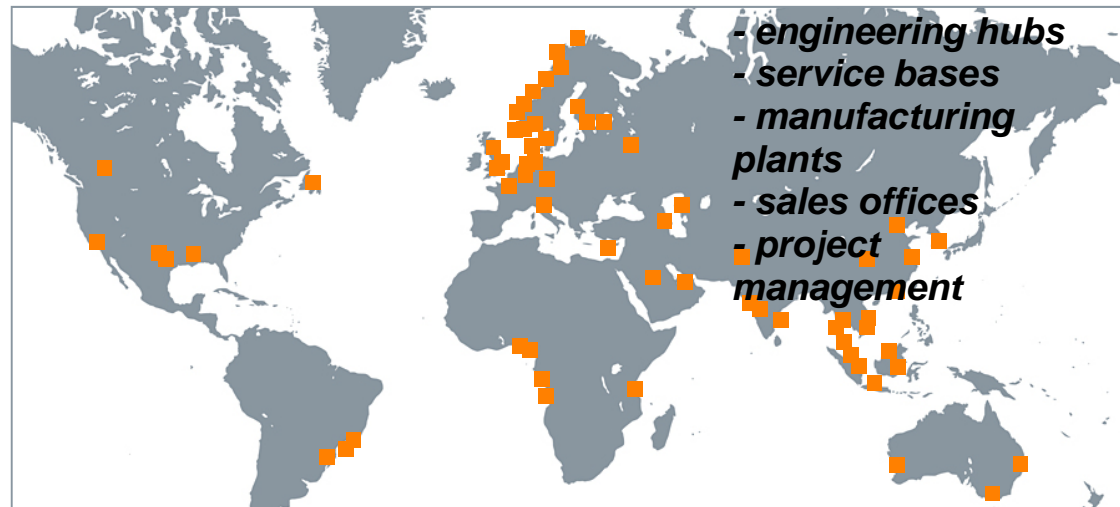Pilot Station   → Assembly Line

Aker Solutions Case

Capture and reuse best practise across **complex split-location engineering projects** with automated standardized designs to deliver quality at reduced time and cost

Global provider of products, systems and services to the oil and gas industry
Employees: **~ 28 000**
Countries: **~ 30**
Locations: **~ 80**

Over **170 years** history

- engineering hubs
- service bases
- manufacturing plants
- sales offices
- project management
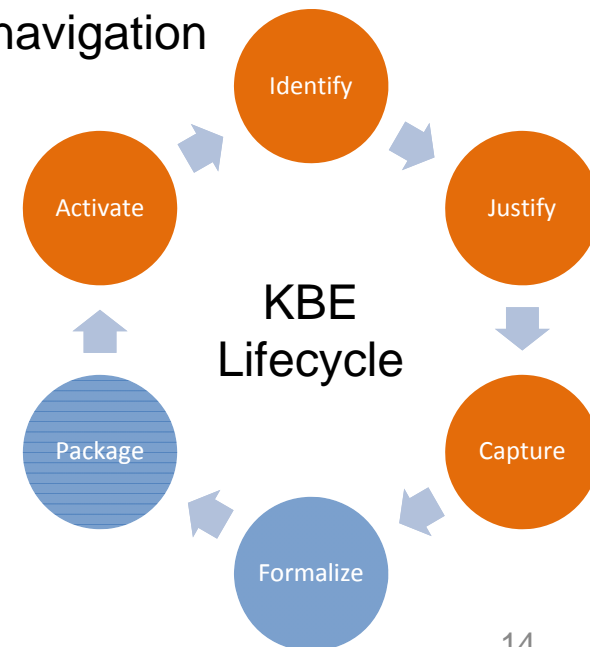
Aker Solutions Case

Knowledge Briefs Modular, simple interfaces to capture and visually communicate knowledge

Virtual Obeya supporting best practices for effective and efficient collaboration within multi-disciplinary split location teams *working on large scale engineering projects.*

- Automated design based on agreed rules
- Retrieve related K-Briefs from within standard engineering tools
- **Smart Links** between K-Briefs, sources, conversations allow navigation

KBE Lifecycle

- Identify
- Justify
- Capture
- Formalize
- Package
- Activate

Aker Solutions Case

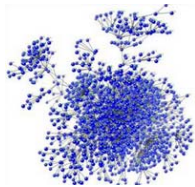| | Share problem and context
Build competence | Build prototypes and test, iterate
Refine & integrate in project
architecture | Evaluate integrated prototypes
Hand-over to business stakeholders |

Architecture & Concept Development → Prototypes and Software Integration → Demonstrator and Hand-over

Examples:
LinkedDesign Ontology → design of enterprise taxonomy

Local - build competency
- Learn from expert knowledge partners in LinkedDesign
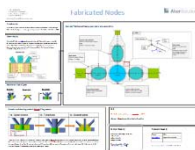- Inform decisions and reduce risk

Enterprise - build competency
- Influence curriculum in internal education programmes
- Hand over to established communities

E.g.: Influence collaboration included in BAL and DYL leadership development progra...

E.g.:
Linked Knowledge Briefs
Virtual Obeya
Rule Interchange Format

Local tool implementation
- Increase scope and efficiency of KBE services in Aker Solutions
- K-Briefs, Virtual Obeya, Rule Interchange Format

Enterprise tool implementation
- Align prototype implementations with global roadmap for knowledge management

E.g.: Knowledge Brief adapted to production infrastructure and workflow support

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Volkswagen Case

- Interconnection of knowledge along the entire production chain (during the hot forming process)
    - Knowledge/data gathering - extension module of the Trimek Metrology Software
        - Incorporation of diverse data sources as well as manufacturing parameters
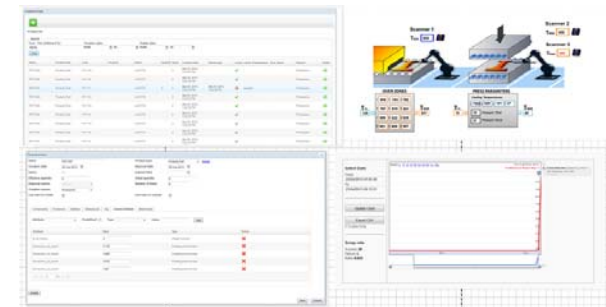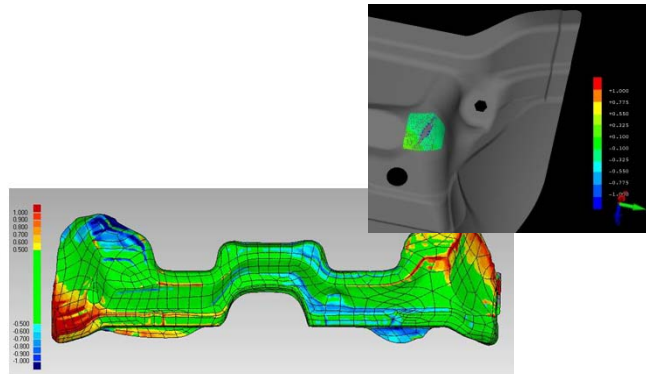
Thank for your attention

www.linkeddesign.eu