Success Stories within Factories of the Future

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EFFRA

- Representing private side in ‘Factories of the Future’ PPP
- 170+ members (Large, SME, RTO etc.) from across Europe
- An experienced, engaged and motivated community
- Actively promotes Factories of the Future PPP & projects
- Collaborates closely with EC to develop strategic research agenda (‘roadmap’)
- Works with national & regional initiatives
EFFRA

Industry Members

www.effra.eu
Factories of the Future: Industry 4.0

Major Changes in Manufacturing

1. industrial revolution
   follows introduction of water- and steam-powered mechanical manufacturing facilities
   End of 18th century

2. industrial revolution
   follows introduction of electrically-powered mass production based on the division of labour
   Start of 20th century

3. industrial revolution
   uses electronics and IT to achieve further automation of manufacturing
   Start of 1970s

4. industrial revolution
   based on Cyber-Physical Systems
   Today

First mechanical loom
1784

First production line,
Cincinnati slaughterhouses
1870

First programmable logic controller
(PLC), Modicon 684
1969
Factories of the Future

- The European Union’s pre-competitive, collaborative programme for manufacturing research & innovation
- Launched in 2010 in response to crisis
- Factories of the Future is a contractual public-private partnership
- The EU & industry have committed to support European research & innovation
- Funded through EU’s Horizon 2020 research & innovation programme
- Budget: €1.15 billion
Factories of the Future projects cover TRL 4 to 7 (i.e. demo activities)
Activities beyond TRL 7 are outside of the Factories of the Future partnership – these may be supported by loans, national/regional actions etc.

<table>
<thead>
<tr>
<th>Technology Readiness Level (TRL) of Manufacturing Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
</tr>
<tr>
<td>Basic principles observed</td>
</tr>
</tbody>
</table>

Covered by Factories of the Future projects
Factories of the Future

Progress to Date

- 250 Projects to date.
- 3,000+ organisations participating
- High involvement of SMEs: 1,000+
- Initiative: ICT innovation for manufacturing SMEs (I4MS)
- Majority of projects feature demo activities
- 800+ results have been reported on EFFRA Innovation Portal
- Close to the market exploitation of project results
- Project results enhancing existing products

portal.effra.eu/projects
## Projects Results & Beyond

<table>
<thead>
<tr>
<th>Year</th>
<th>Nr of projects</th>
<th>Cumulative total</th>
</tr>
</thead>
<tbody>
<tr>
<td>FoF-2010</td>
<td>25 projects</td>
<td>25</td>
</tr>
<tr>
<td>FoF-2011</td>
<td>36 projects</td>
<td>61</td>
</tr>
<tr>
<td>FoF-2012</td>
<td>37 projects</td>
<td>98</td>
</tr>
<tr>
<td>FoF-2013</td>
<td>53 projects</td>
<td>151</td>
</tr>
<tr>
<td>FoF-2014</td>
<td>25 projects</td>
<td>180</td>
</tr>
<tr>
<td>FoF-2015</td>
<td>28 projects</td>
<td>208</td>
</tr>
</tbody>
</table>

*FoF-2010* and *FoF-2012* projects include post-project investments.

**Factories of the Future**
Factories of the Future

National Initiatives
Factories of the Future 2020

Strategic Research Agenda (Roadmap)

- Developed by EFFRA & through broad public consultation.
- Identifies megatrends which drive structural changes in manufacturing sectors.
- Establishes research priorities which will allow industry to meet these challenges.
- Priorities focus on development, application & integration of enablers & technologies.
- ‘Factories of the Future’ call topics based upon research priorities = industry relevant.
- Not static: Evolving priorities – Factories 4.0.
Factories of the Future 2020

Strategic Research Agenda (Roadmap)

**Research & Innovation Priorities**

**Domain 1: Advanced Manufacturing Processes**
Innovative processing for both new & current materials or products

**Domain 2: Adaptive and Smart Manufacturing Systems**
Innovative manufacturing equipment at component & system level, including mechatronics, control & monitoring systems

**Domain 3: Digital, Virtual & Resource Efficient Factories**
Factory design, data collection & management, operation & planning, from real-time to long term optimisation approaches

**Domain 4: Collaborative & Mobile Enterprises**
Networked factories & dynamic supply chains

**Domain 5: Human-Centred Manufacturing**
Enhancing the role of people in factories

**Domain 6: Customer-Focused Manufacturing**
Involving customers in manufacturing value chain, from product process design to manufacturing and associated innovative services

**Challenges & Opportunities**
- Manufacturing Future Products
- Economic
- Social
- Environmental

**Technologies & Enablers**
- Advanced Manufacturing Processes
- Mechatronics for Advanced Manufacturing Systems
- Information & Communication Technologies
- Manufacturing Strategies
- Knowledge Workers
- Modelling, Simulation & Forecasting
FoF 1 – 2014: Process optimisation of manufacturing assets
FoF 2 – 2014: Manufacturing processes for complex structures and geometries with efficient use of material
FoF 3 – 2014: Global energy and other resources efficiency in manufacturing enterprises
FoF 4 – 2014: Developing smart factories that are attractive to workers
FoF 5 – 2014: Innovative product-service design using manufacturing intelligence
FoF 6 – 2014: Symbiotic human-robot collaborations for safe and dynamic multimodal manufacturing systems
FoF 7 – 2014: Support for the enhancement of the impact of FoF PPP projects
FoF 8 – 2015: ICT-enabled modelling, simulation, analytics and forecasting technologies
FoF 9 – 2015: ICT Innovation for Manufacturing SMEs (I4MS)
FoF 10 – 2015: Manufacturing of custom made parts for personalised products
FoF 11 – 2015: Flexible production systems based on integrated tools for rapid reconfiguration of machinery and robots
FoF 12 – 2015: Industrial technologies for advanced joining and assembly processes of multi-materials
FoF 13 – 2015: Re-use and re-manufacturing technologies and equipment for sustainable product lifecycle management
FoF 14 – 2015: Integrated design and management of cyber-physical systems and processes

FoF-01-2016: Novel hybrid approaches for additive and subtractive manufacturing machines
FoF-02-2016: Machinery and robot systems in dynamic shop floor environments using novel embedded cognitive functions
FoF-03-2016: Zero-defect strategies at system level for multi-stage manufacturing in production lines
FoF-04-2016: Continuous adaptation of work environments with changing levels of automation in evolving production systems
FoF-05-2016: Support for the further development of Additive Manufacturing technologies in Europe
FoF-06-2017: New product functionalities through advanced surface manufacturing processes for mass production
FoF-07-2017: Integration of unconventional technologies for multi-material processing into manufacturing systems
FoF-08-2017: In-line measurement and control for micro-/nano-enabled high-volume manufacturing for enhanced reliability
FoF-09-2017: Novel design and predictive maintenance technologies for increased operating life of production systems
FoF-10-2017: New technologies and life cycle management for reconfigurable and reusable customised products
FoF-11-2017: Digital automation
FoF-12-2017: ICT Innovation for Manufacturing SMEs (I4MS)
FoF-13-2017: Photonics Laser-based production
Factories of the Future

Digitisation & Manufacturing

- ‘Digitisation’ affects multiple aspects of manufacturing such as:
  - Process quality – monitoring and control
  - Interconnectivity of machines
  - Plant management
  - Data processing
  - Apps for workers
  - Training

- Advanced manufacturing cannot evolve without digitisation.
- Equally innovations in digitisation will be driven by the demands of advanced manufacturing.
- Manufacturing companies becoming much more involved in developing digital services & ICT-enabled tech. to meet their particular needs.
Factories of the Future

Digital Issues

- Selection of digital issues impacting on & being addressed in ‘Factories of the Future’
Factories of the Future Success Story: Human-Robot Cooperation

ROBO-MATE

- Intelligent exoskeleton based on human-robot interaction for manipulation of heavy goods in Europe’s factories of the future.

- Budget: €5,879,430
- Duration: 36 months
- 11 partners

- Spin-off: Robo.Mate
- Three modules:
  - Passive Parallelogram Arms
  - Active Parallelogram Arms
  - Core Trunk

www.robo-mate.eu
Factories of the Future Success Story: Human-Robot Cooperation

ROBO-MATE
Factories of the Future Success Story: Plug-and- Produce

i-Ramp

- Intelligent reconfigurable machines for smart plug & produce production
- Transformation of conventional production equipment into Network-enabled Devices (NETDEVs)
- Budget: € 6,724,981  | 11 partners
- Duration: 36 months
  - Demonstrators
    - Set-up & ramp-up of a new E-Vehicle assembly line (robot cell)
    - Component exchange in E-Vehicle subassembly unit
    - Enhancing devices with re-use & predictive maintenance capabilities

www.i-ramp3.eu
Factories of the Future Success Story: Digital Factories

VISTRA

- Virtual simulation & training of assembly & service processes in digital factories.
- Budget: € 5,336,798
- Duration: 36 months
- 12 partners

Results

- User Interaction Module
- Data Import, Filter and Mapping
- Unified Model for Virtual Assembly Training
- Simulation of Flexible Parts
- Knowledge Sharing Module

Spin-off: Sentio Training system for complex assembly

www.vistra-project.eu
Factories of the Future Success Story: Digital Factories

VISTRA

Door Experiment

Easy

Medium

Expert

- INSTALL FRONT DOOR LOCK
- INSTALL LH WEATHERSTRIP ON WIDO FRM FRRT S/D 1/S
- INSTALL LH FRONT DOOR OUTER WINDOW FRAME COVER
- INSTALL LH BRACKET HANDLE FRRT S/D - LHD
- INSTALL LH HANDLE - LHD
- INSTALL LH COVER-FRT S/D LK - LHD
- INSTALL LH LINK ASM-FRT S/D CHK TO FRRT S/D
- PLACE LH WDO REGULATOR IN FRRT S/D
- INSTALL LH DOOR WDO TO /FRRT S/D
- SECURE LH WDO REGULATOR IN FRRT S/D

Begin Trainingplan
Factories of the Future Success Story: HPC Simulation

Fortissimo

- Factories of the future resources, technology, infrastructure & services for simulation & modelling
- On-demand access to advanced simulation, modelling & data analytics resources including software, hardware & expertise.
- Participated in I4MS
- Duration: 36 months
- Budget: € 21,657,380
- 44 partners
  - Demonstrators:
    - Validation experiments
  - Spin-off: Fortissimo Marketplace

www.fortissimo-project.eu
Factories of the Future Success Story: On-Demand Manufacturing

OPTICIAN2020

- Flexible and on-demand manufacturing of customised spectacles by close-to-optician production clusters
- Budget: € 5,770,513
- Duration 36 months
- 10 partners
- Demonstrators:
  - Mini-factory validation
  - Networked mini-factories
Factories of the Future Success Story: On-Demand Manufacturing

OPTICIAN2020
Opening Soon!

Call Topics

- Call officially opens end of October
- Draft Topics
  - FoF-01-2018: Skills needed for new Manufacturing jobs
  - FoF-02-2018: Effective Industrial Human-Robot Collaboration
  - FoF-03-2018: Innovative manufacturing of opto-electrical parts
  - FoF-04-2018: Pilot lines for metal Additive Manufacturing
  - ICT-07-2018: Digital manufacturing platforms for connected smart factories (1)
- 2019: Draft topics also available (call opens next year)
- Find potential project partners or potential projects to join: portal.effra.eu/projectideas
- Need advice? Contact your national contact point for Horizon 2020
Villmols merci!

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