



H2020 Workprogramme 2016-17

Photonics support to manufacturing in H2020 (2016)

Factories of the Future –

FoF-13-2016 Photonics laser-based production

- World market of laser-based manufacturing systems
2012: 8 B€
- Expected growth rate (CAGR): **7%** (from 2011 to 2020)
- **EU market share 2012: 33%** but in **2008: 39%**
due to fierce competition mainly from Asia
- → reverse the decline
- Large economic **leverage** effect in a wide range of industry
e.g. automotive, aerospace, electronics, medical, consumer goods, etc .
medical examples: pace makers, synthetic bones, endoscopes, stents, ...

- Need to keep European technology at the forefront of innovation
- Need to bundle forces on a European level addressing research issues efficiently and effectively

Support in FP7 and H2020 via

- *ICT Photonics programme*
- *Factories of the Future initiative (FoF PPP)*
- *Programme on Nanosciences, Nanotechnologies, Materials and new Production Technologies (NMP)*

Examples of research themes in FP7 and H2020:

■ **Lasers for industrial processing:**

high peak/average power lasers, widely tuneable lasers, ultra-short pulse lasers, fibres and fibre lasers, diode lasers, component integration, new wavelengths and frequency conversion, remote processing, on-line adaptation of beam properties, process monitoring and related devices, synchronization of sources and devices, multiple beam processing

- **Funding** \approx **80 M€** Photonics and FoF (FP7 & H2020 2014, 2015)
(+ projects from NMP)

Examples of projects in FP7:

Project Acronym	Project Title
APPOLO	Hub of Application Laboratories for Equipment Assessment in Laser Based Manufacturing
BRIDLE	BRilliant Industrial Diode LasEr
HALO	High power Adaptable Laser beams for materials prOcessing
IMPROV	Innovative Mid-infrared high Power source for resonant ablation of Organic based photovoltaic devices
ISLA	Integrated disruptive componentS for 2um fibre LASers
QCOALA	Quality Control of Aluminium Laser-welded Assemblies
UV-Marking	Development of new UV laser for customization at industrial level trough high quality marking on different materials
LASHARE	Laser equipment Assessment for High impAct innovation in the manufactuRing European industry
RLW Navigator	Remote Laser Welding System Navigator for Eco & Resilient Automotive Factories
TiSa TD	Ultrafast High-Average Power Ti:Sapphire Thin-Disk Oscillators and Amplifiers (under negotiation)
Ultrafast_RAZipol	Ultrafast Lasers with Radial and Azimuthal Polarizations for High-efficiency Micro-machining Applications
LIFT	Leadership in Fibre Laser Technology
ALPINE	Advanced Lasers for Photovoltaic INdustrial processing Enhancement
POLYBRIGHT	Extending the process limits of laser polymer welding with high-brilliance beam sources

Examples of projects in H2020:

Project Acronym	Project Title
ADALAM	Sensor based adaptive laser micromachining using ultrashort pulse lasers for zero-failure manufacturing
COMBILASER	Combination of non-contact, high speed monitoring and non-destructive techniques applicable to LASER Based Manufacturing through a self-learning system
MASHES	Multimodal spectral control of laser processing with cognitive abilities
RADICLE	Real-time dynamic control system for laser welding
<i>NN</i>	<i>Further Grant Agreements currently under preparation</i>

Call dates (tentative)

- **Publication: 15 October 2015**
- **Deadline: 21 January 2016**

DRAFT

FoF-13-2016 Photonics Laser-based production

a) "From design to piece" – Excellence in laser-based additive industrial manufacturing

- Research and Innovation Actions (RIA)
- Funding 15 million Euro

b) Rapid individualised laser-based production

- Innovation Actions (IA)
- Funding 15 million Euro

a) RIA : Additive industrial manufacturing (laser-based)

Market of AM in 2012: 1.7 B€ (materials, systems and services) (Roland Berger consulting)
Expected Growth: 2018: 4,5 B€ 2023: 7,7 B€ CAGR ~ 14,7%

Challenges

- **Huge potential, advantages over conventional manufacturing:**
highly flexible & customisable process, freedom of design, e.g. geometry, material composition, intrinsic properties Complexity for FREE Digital Photonic Production
- Currently used prototyping and smaller markets, e.g. medical applications, rapid prototyping, repair
- **HOWEVER:** AM is not yet competitive on a larger scale
- Problems include: production speed and costs

a) **RIA (ctd): Additive industrial manufacturing (laser-based)**

Challenges:

- **→ need to:**

- **increase productivity**
- **bring AM a significant step further towards industrial manufacturing**

by better **mastering all stages** of the production process
AND their interaction

Note: complementing the topic FOF-1-2016

a) RIA (ctd) : Additive industrial manufacturing (laser-based)

Scope:

- From design to final work piece: Laser based additive industrial manufacturing of metallic materials
- all process chain steps may be addressed (e.g. CAD, modelling, additive process, different materials in a single work piece, process control, QA, combination additive/subtractive, surface finish, etc)
- → significantly improve the overall performance in terms of speed and costs whilst producing high quality work pieces

- at least two important steps and the links between them
- laser based process
- metallic materials

MUST

- address standardisation as appropriate
- be driven by concrete business cases
- contain outline of business case and industrial exploitation strategy
- include relevant partners of the value chain in the proposal

Should

a) RIA (ctd) : **Additive industrial manufacturing (laser-based)**

Expected impacts:

- Reinforced **industrial leadership** in laser-based Additive Manufacturing
- Substantially improved production **speed**, improved **productivity** and substantially reduced **costs** of laser-based Additive Manufacturing

Funding:

- **2-4 million Euro** per project (other amounts possible)

Budget available:

- **15 million Euro**

b) Innovation actions: Rapid individualised laser-based production

Challenge:

- **Laser based manufacturing:**
 - backbone of modern production processes
 - highly accurate mass production
 - wide range of products, industries
 - highly flexible
- **Problem: Changes of lots require interventions, down times**
- **Trend to individualisation requires:**
 - a high degree of digitization
 - highly autonomous and automated tools and systems to reduce production time and costs

**pilot
facilities**

b) Innovation actions (ctd) : Rapid individualised laser-based production

Scope:

- **Development and set-up of highly flexible high throughput pilot facilities** on the basis of **existing** laser-based production processes
 - **Validation in real settings**
 - **Advances needed in a number of aspects** (eg intelligent networking and machine cooperation, data handling, modelling, work piece handling, beam delivery, integration of different processes, monitoring, process control etc.)
- Industry driven**
- Include the key stakeholders running the pilot facility**
- Outline business case and industrial exploitation strategy**

MUST

Should

b) Innovation actions (ctd):

Rapid individualised laser-based production

Expected impacts:

- **More efficient, more flexible and higher throughput** of individualised laser-based production.
- **Improved competitiveness and strengthened Europe's market position** of laser-based manufacturing industry (equipment and suppliers) and the end-user industry.

Funding:

- **2-4 million Euro per project** (other amounts possible)

Budget available:

- **15 million Euro**

For more information



■ ICT event 2015 in Lisbon, 20-22 October

<http://ec.europa.eu/digital-agenda/en/ict2015-innovate-connect-transform-lisbon-20-22-october-2015>

➤ Pre-Publication of the call

https://ec.europa.eu/programmes/horizon2020/sites/horizon2020/files/17.%20CROSS%20CUTTING_2016-2017_pre-publication.pdf

➤ Horizon 2020 <http://ec.europa.eu/programmes/horizon2020/en/>

➤ Participant Portal

<http://ec.europa.eu/research/participants/portal/desktop/en/home.html>

➤ Photonics21 and Photonics Public Private Partnership:

 PHOTONICS²¹

<http://www.photonics21.org>



We are looking for experts



We are urgently looking for experts

for the evaluation of proposals and project reviews

- for **all fields** of photonics
- most **urgently** for FoF / laser-based manufacturing

Also industrialists and
women welcome !

Interested? Please:

- **Register** in the Commission's experts database:
<http://ec.europa.eu/research/participants/portal/desktop/en/experts/index.html>
 - **Send your CV to:** CNECT-PHOTONICS@ec.europa.eu
 - **Tell us your registration number**
- + If you know of other experts please inform them of the above.