



# La fabbrica Smart & Green: Presente e Futuro



La fabbrica Smart & Green: efficacia ed efficienza nella produzione

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Paolo Calefati

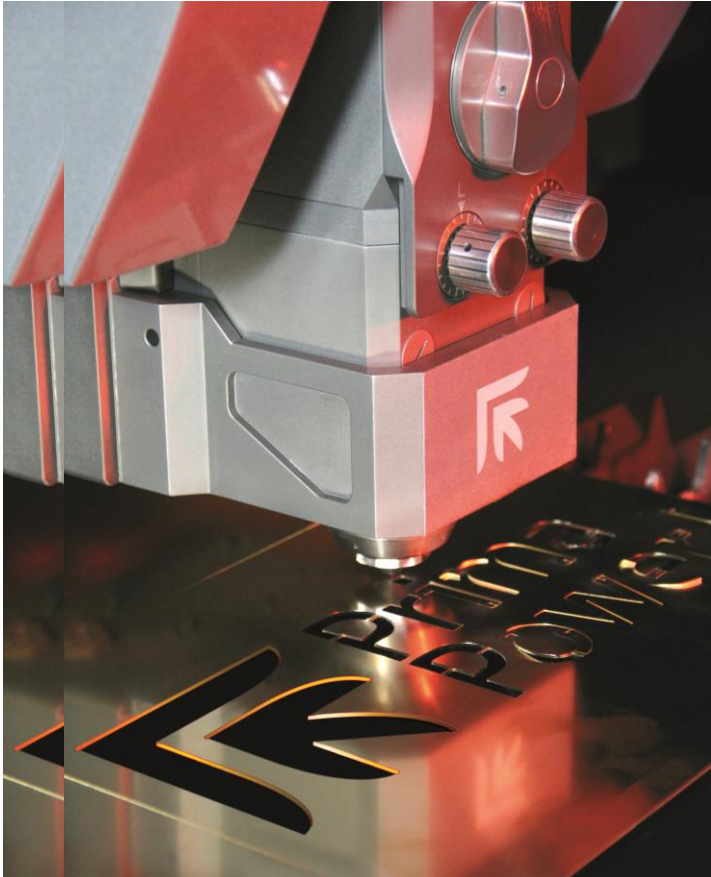


# Summary

- Prima Power: Company Overview
- Sustainable Manufacturing
- “Green Means”
- Key enabling technologies
- Eneplan
- Key enabling technologies for a sustainable manufacturing
- Innovation strategy for laser processes
- LIFE project
- White’R project
- Laser-based Additive Manufacturing
- Borealis project
- Conclusions



# Prima Power: Company Overview



Prima Power is among the top 4 in laser and sheet metal machinery, with over 35 years' experience and one of the widest product and service range in the field.

We are active in all continents with a direct presence or through our specialized dealers and agents.



# Our Group - business sectors



## Machinery Division

## Electronics & laser technologies

Laser and sheet metal fabrication machinery: 2D and 3D laser cutting, welding and drilling, punching, combined punching/laser or punching/shearing, bending, automation and FMS.

Industrial electronics (power and control electronics, numerical control).

High power CO<sub>2</sub> and Nd:YAG laser sources for industrial applications.



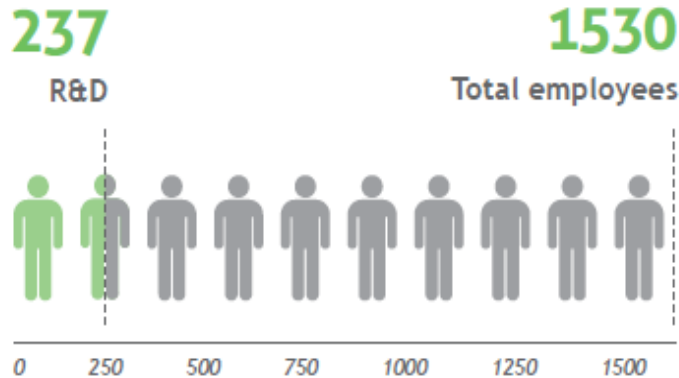


## Our Group - main figures

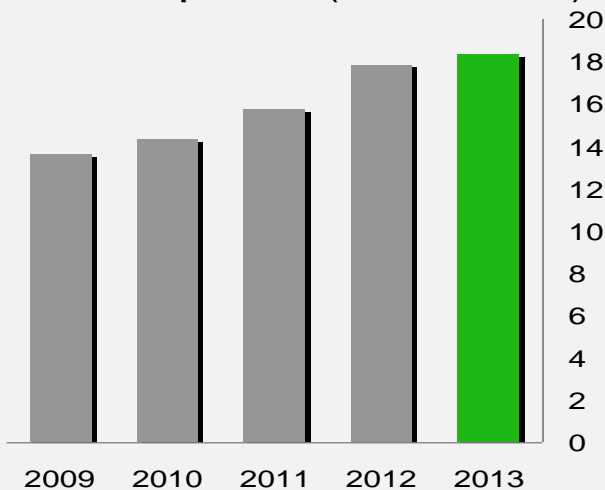
- 2** Divisions: Machinery, Prima Power - Electronics, Prima Electro
- 37** years of experience in the sector
- 15+** years in the Milan's Stock Exchange
- ~1,530** employees
- +12,000** machines and systems worldwide
- ~336m €** sales in 2013
- 5.5%** of sales invested yearly in R&D
- 8** manufacturing facilities in Italy, Finland, USA, China
- 7** R&D centers in Italy, Finland and USA
- 70+** countries covered by own units and distributors



# Prima Power: research & innovation



R&D Expenses (euro million)



- A long history of innovation, first laser machine for automotive application in 1979
- Pioneering experience in servo-electric technology for efficient and eco-friendly punching and bending systems
- Strong investments in R&D: 5.5% of sales in 2013. Since 2009 the group increased the R&D investments by one-third
- Over 15% of group staff employed in R&D
- Product range always at the cutting edge of technology
- The widest range of modern, efficient, sustainable machines for the sheet metal processing



# Prima Power: product range

The Punch

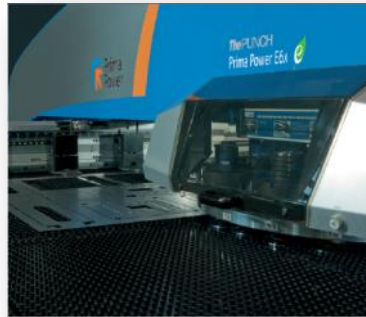
The Laser

The Bend

The Combi

The System

The Software



The Punch



The Laser



The Bend



The Combi



The System



The Software





# Sustainable Manufacturing

Everybody knows what it is ...

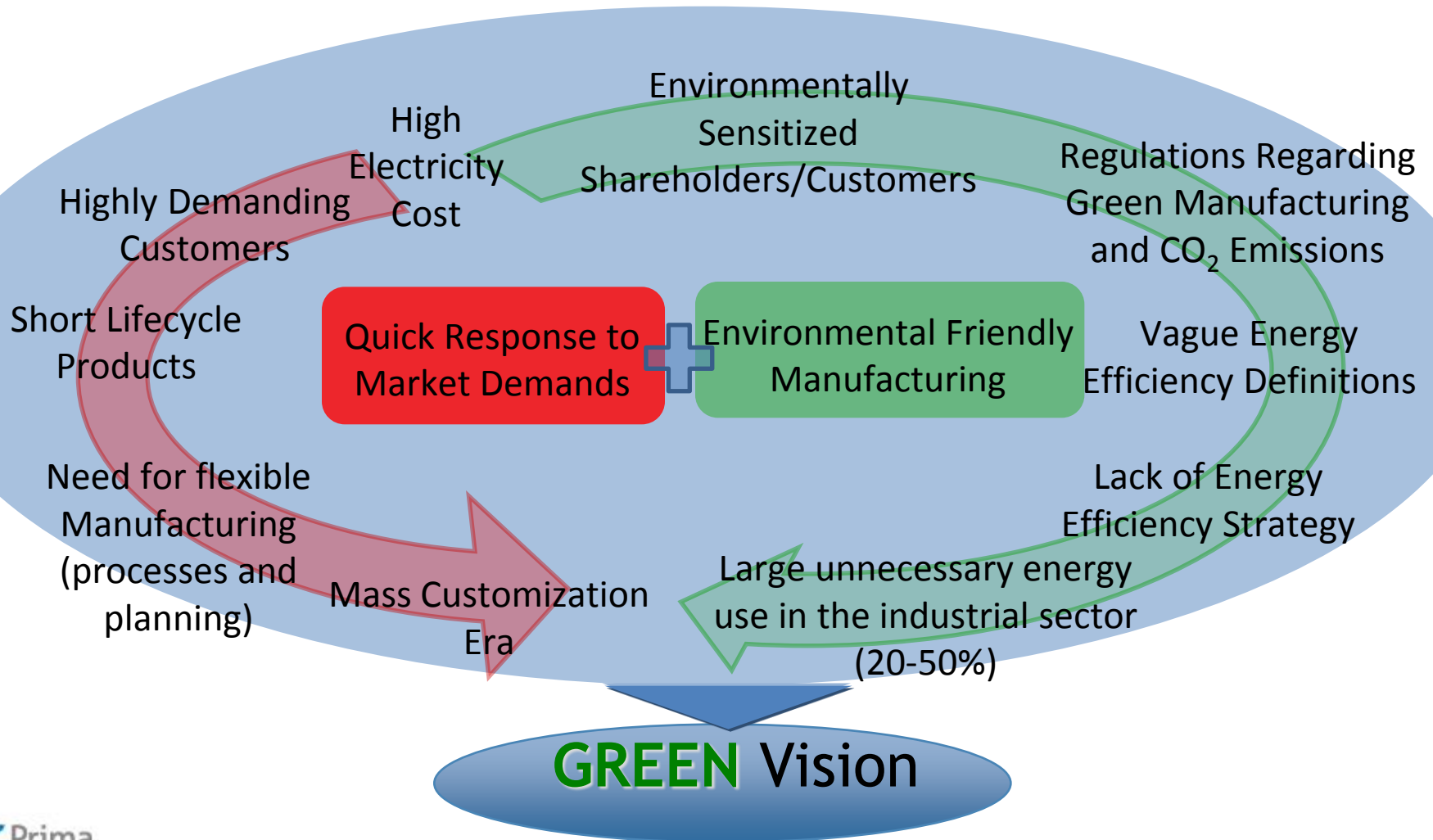


... but is it sustainable manufacturing really a driver for improving business ?





# Sustainable Manufacturing





## Prima Power: Green Means



**MORE PROFIT**



**LOWER IMPACT**

Green Means combines profit and footprint through:

- efficiency
- low energy, maintenance, operating costs
- flexibility
- automation



# Prima Power: Green Facts



64%

CO<sub>2</sub> emissions reduction with our *servo-electric panel benders*



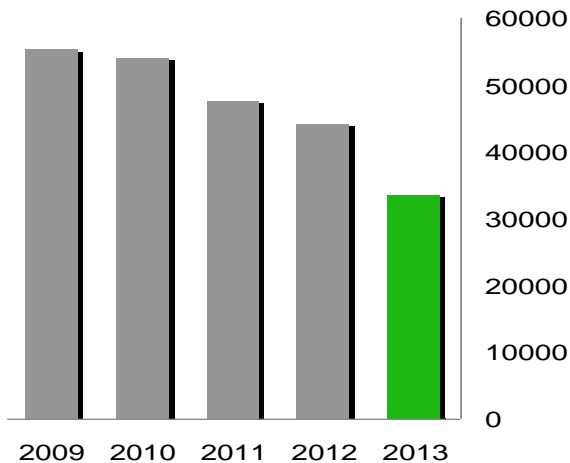
82%

Energy saved by our *servo-electric punching* with ECOPUNCH® technology



~13%

Scrap material reduction with our *punch-shear* technology



*Laser Sources*

Yearly CO<sub>2</sub> emissions reduction per unit (kg) thanks to latest generation lasers

## ENERGY SAVING

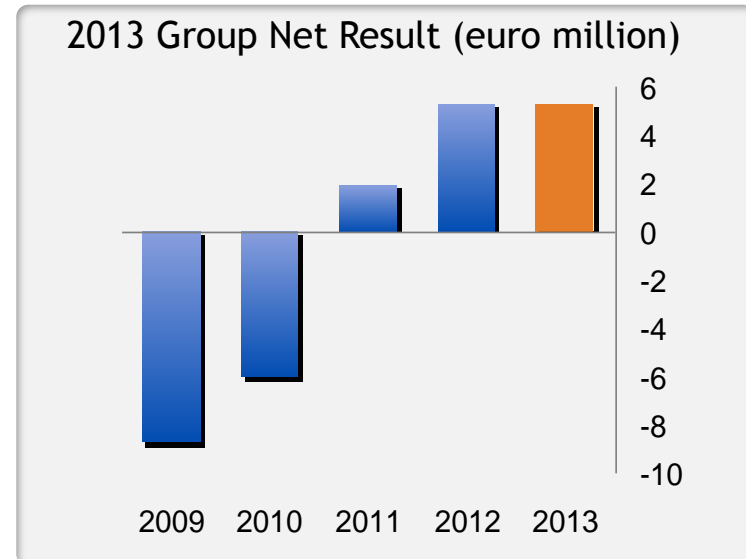
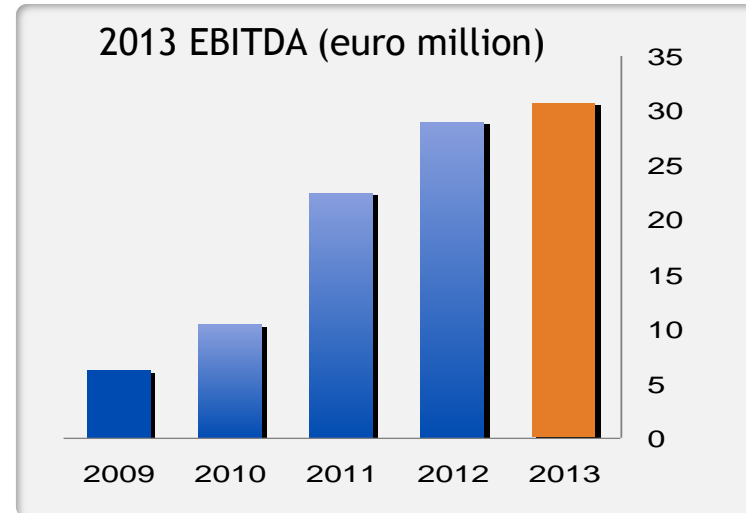
kWh



Number of kWh saved yearly for the production of a typical sheet metal component thanks to our new generation laser machines, more efficient and more productive



# The results of the green means



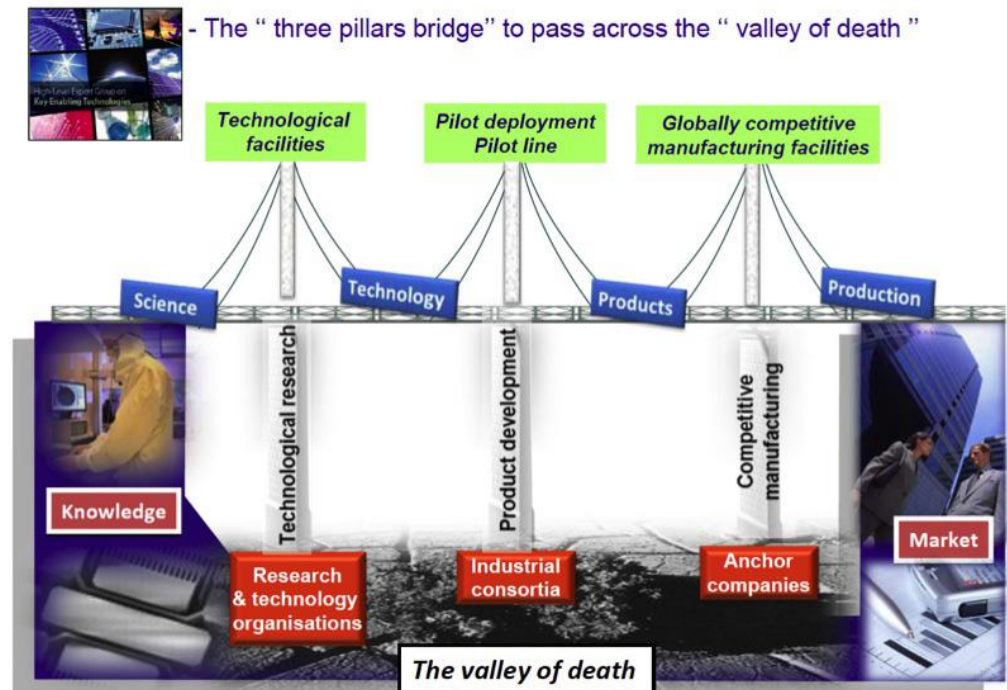
Sustainable machines and technology innovation has allowed to restore business at a pre-crisis level.



# The Future: from Key Enabling Technologies (KET) to Business!

A significant part of future goods and services are as yet unknown, but the main driving force behind their development will be Key Enabling Technologies (KETs), such as **nanotechnology**, **micro and nanoelectronics** including semiconductors, **advanced materials and manufacturing**, biotechnology and **photonics**. Mastering these technologies means being at the forefront of managing the shift to a low carbon, knowledge-based economy.

- Advanced Manufacturing System
- Photonics
- Micro and nanoelectronics





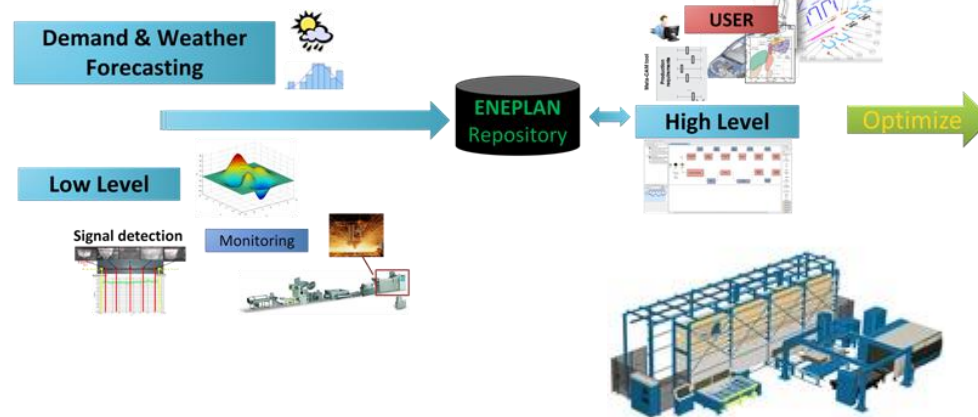
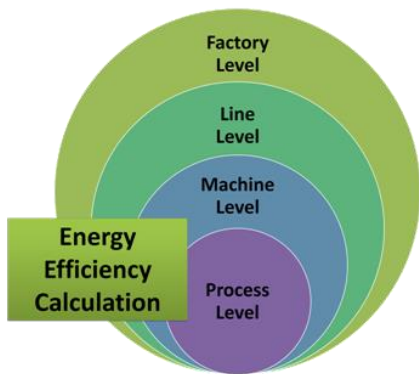
# Advanced Manufacturing System: ENEPLAN

**ENEPLAN**

*Energy Efficient  
Process Planning System*



Prima  
Power







# Advanced Manufacturing System: ENEPLAN

Business model configuration & market demand forecasting

Manufacturing Process Modeling

Machine tool “green” assessment method

Monitoring for energy & eco efficiency



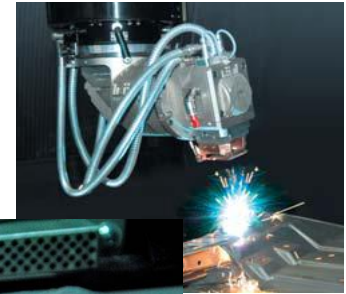
*Think Green*



# Photonics as key enabling technologies for a sustainable manufacturing

## Laser in Material processing:

- Laser cutting
- Laser welding
- Laser cladding
- Additive manufacturing
- Laser texturing
- Laser ablation





# Innovation strategy for laser processes

High Volume



High Margin

STANDARD, COMMERCIAL COMPONENTS (outsourcing)

R&D development  
Prima core business

Research



# New Generation of optical components and laser sources



new optic fiber laser sources

systems for the light transmission

LIFE = Laser innovativi in fibra ottica eye-safe

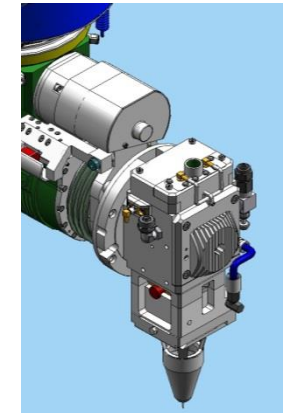
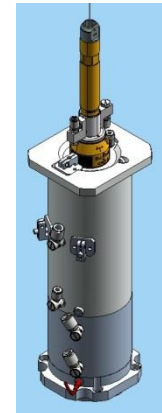
New architecture of laser sources to improve the energy efficiency



Fiber delivery cables studied and realized by Technikabel and HTC



Adaptive collimators and laser heads

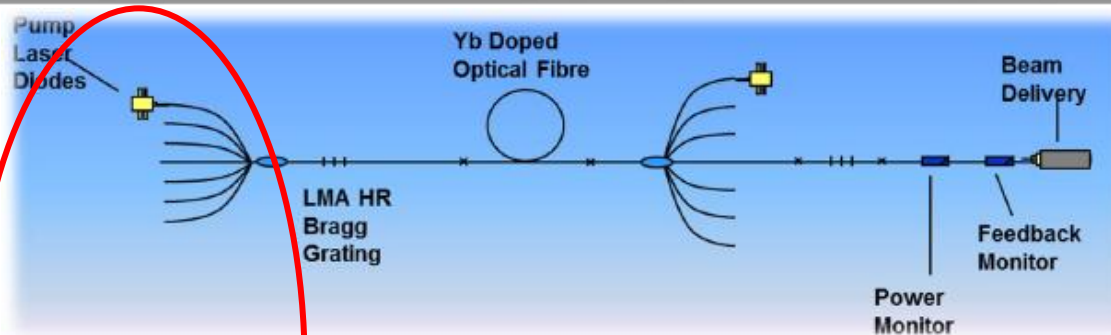




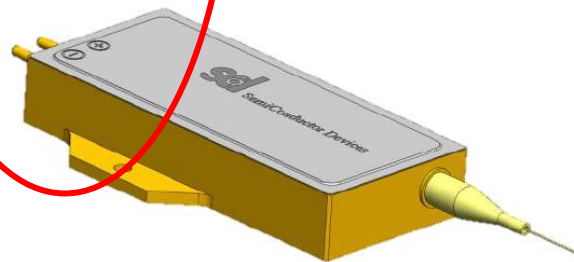
WHITE'R = White Room based on reconfigurable island for optoelectronics

**white'R** is a necessary action to translate this RTD excellence into future leadership in manufacturing high value added optoelectronic devices. The new manufacturing concept is based on the combination of fully automated, self contained, **white room** modules whose components - robots, end effectors, transport, handling and tooling systems - are conceived as Plug-n-produce mechatronic sub-modules properly configured coherently with the production requirements.





Fiber laser source scheme



## Diode multiemitter (a large family product range):

- Different power (from 8 up to 110 W)
- Different shape (different alignment of micro lenses...)
- Different wavelength of emission



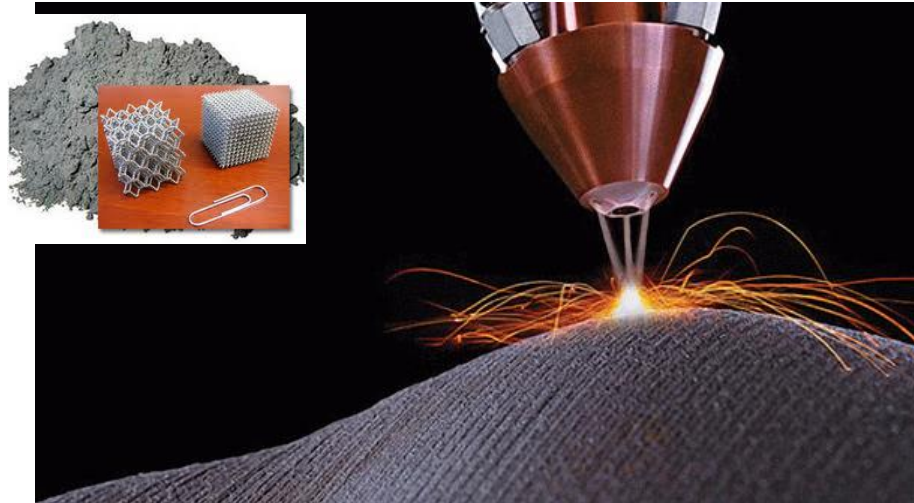
## Objectives:

- Cost reduction
- Flexible production and customization
- De-manufacturing
- Rare earth recycling





# Laser-based Additive Manufacturing



**Additive Manufacturing**

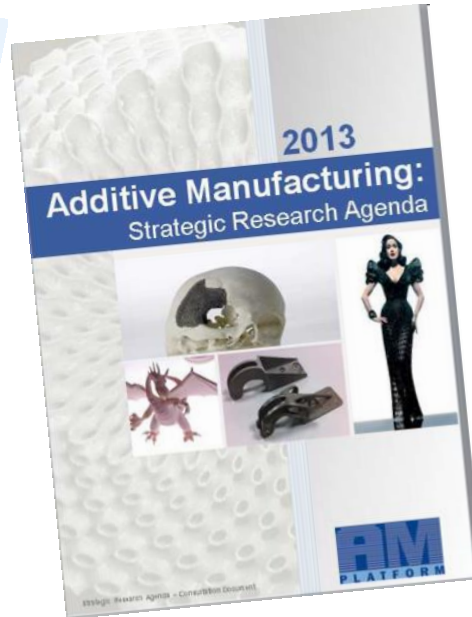
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**3D Printing, Rapid Prototyping, Direct  
Digital Manufacturing, ...**





# Laser-based Additive Manufacturing



CONFIRMATION as to how seriously some companies are taking additive manufacturing, popularly known as 3D printing, came on November 20th when GE Aviation, part of the world's biggest manufacturing group, bought a privately owned company called Morris Technologies. This is a small precision-engineering firm employing 130 people in suburban Cincinnati, Ohio. Morris Technologies has invested heavily in 3D printing equipment and will be printing bits for a new range of jet engines. Morris Technologies uses a number of 3D printing machines, all of which work by using a digital description of an object to build it in physical form, layer by layer. Among the 3D printing technologies used by Morris Technologies is laser sintering. This involves spreading a thin layer of metallic powder onto a build platform and then fusing the material with a laser beam. The process is repeated until an object emerges. Laser sintering is capable of producing all kinds of metal parts, including components made from aerospace-grade titanium.

One of the attractions of printing parts is that it saves material. Instead of machining components from solid billets of metal, in which much of it may be cut away, only the material that is needed to shape the part is used. Printed parts can also be made lighter than forged parts, which promises fuel savings.

Many manufacturers already use 3D printing to make prototypes of parts, because it is cheaper and more flexible than tooling up to produce just one or two items. But the technology is now good enough for it to be used to make production items too.

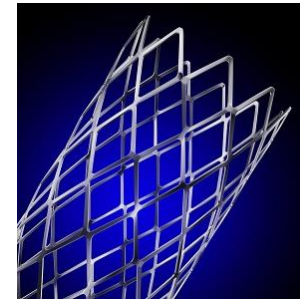
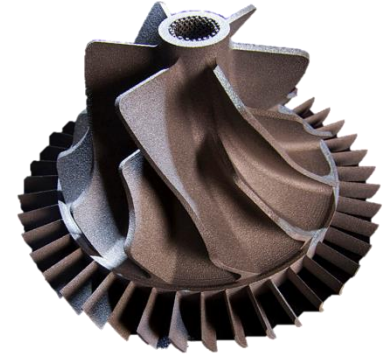
Among the components that Morris Technologies plans to print will be some used in the LEAP jet engine (pictured), which is being developed by CFM International, a joint venture between GE Aviation and Snecma of France. The LEAP engine is scheduled to enter service in the next few years on a number of short-haul airliners. More than 4,000 engines have already been ordered.

One of the “hottest” applications of photonics in advanced manufacturing



# Laser-based Additive Manufacturing

- Aerospace
- Automotive
- Bioengineering
- Energy
- Architectural design





# Additive Manufacturing

# BOREALIS

BOREALIS = the 3 A energy class flexible machine for the new additive and subtractive manufacturing of next generation of complex 3D metal parts



**Materials:** metals, focus on Titanium alloys and on functionally graded materials

**Part dimensions:** Up to 500x2000x1000 mm

**Complexity:** focus on parts that are otherwise unmanufacturable

**Productivity:** 7 kg/h deposition rate

**Material usage:** -50% with same final functionalities

**Cost:** -20% with same final functionalities

**Energy consumption in manufacturing:** -20%

**Quality:** 0 faulty manufactured part







# Photonic in Piedmont







## Conclusions

- Sustainability is the future of manufacturing in Europe and produces value and business
- Key enabling Technology will improve the added value and will drive research and innovation in the next years
- Today photonics is already one of the keys of the sustainability in manufacturing contexts
- In the future, photonics will change the manufacturing paradigms and will improve more and more the manufacturing sustainability with new processes and new adopted materials
- The priority is to sustain Photonics Innovation and Research and to cluster local companies to become **more competitive together**



**If you want to go fast go alone,  
If you want to go far go together**

*Thank you for your attention*

paolo.calefati@primapower.com