MELTIO

Past. Present. Future

INDUSTRIAL SECTOR

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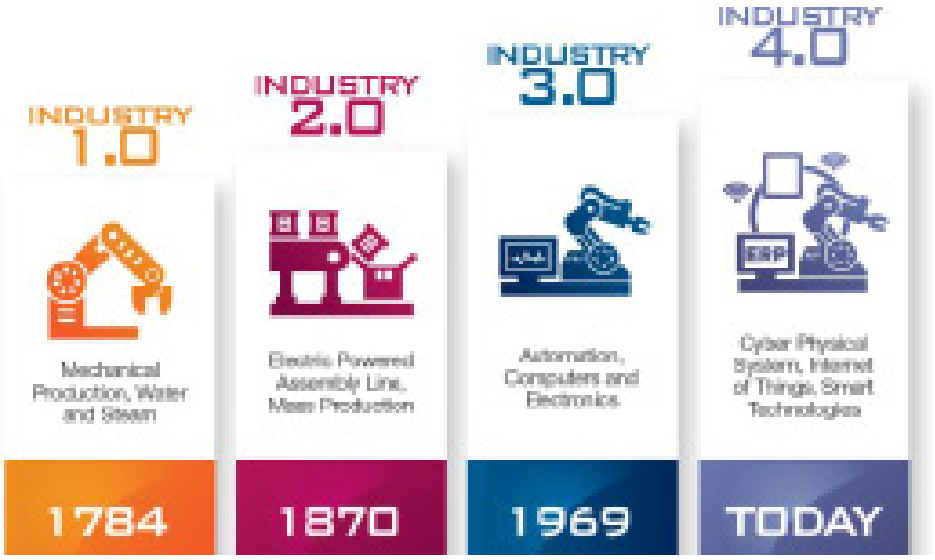
CONTENIDO

1

INDUSTRY 4.0

Industry 4.0 emerges as a new Industrial Revolution, which consists of incorporating new technologies (Cloud, cyber-physical systems, sensors, 3D printing, etc.) to the industry. It is established as a new industrial path that leading developed countries are already traversing.



Fuente:
hipermediaciones.com

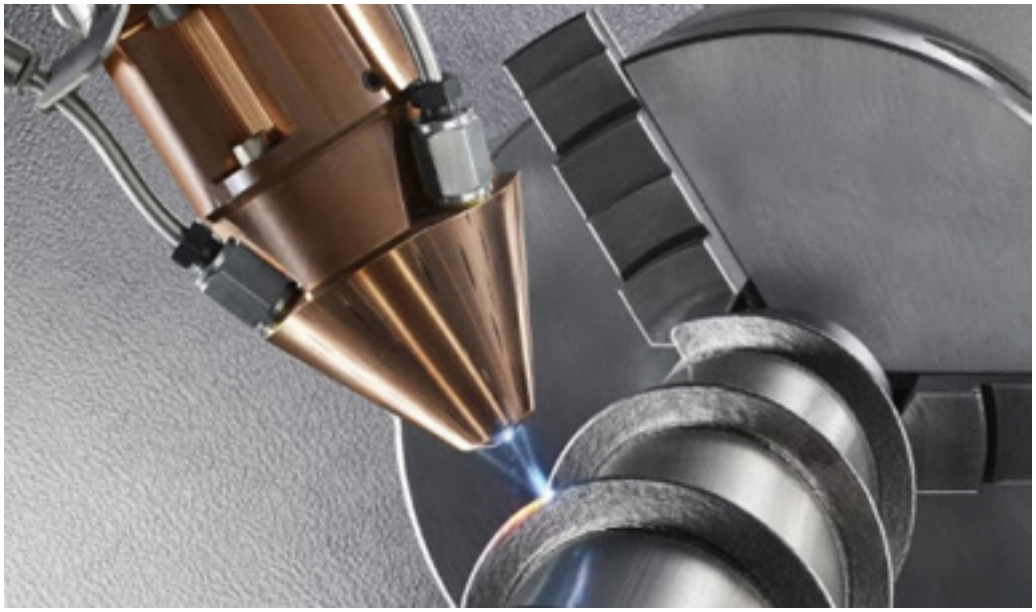
Digital transformation is a challenge for the global industry, but it also offers the opportunity to improve its competitive position.

The term 'Industry 4.0' shows the beginning of the fourth industrial revolution. This is driven by digital transformation, signifying a qualitative leap in the Organization and Management of the value chain of each sector.

4

Past. Present. Future **Industrial sector**

The digital transformation of the industry implies the application of a set of technologies throughout its entire value chain. These changes generate benefits both at the process level, as well as at the product / service and business model level. Likewise, these changes have a direct impact on the strategy, personnel, and infrastructures of companies.



2 DIGITAL ENABLERS

Business models must identify which technologies (digital enablers) can help you in each case to get closer to your goals and how to integrate them. The process by which each company establishes a roadmap towards these objectives is called Digital Transformation.

Communication and data processing

These enablers are increasingly demanding greater capacity at lower cost. They collect the information from the first category of enablers, transport it, offer processing capacity and guarantee its security to make it available to the last layer of enablers, the management applications. It also conducts this communication in the reverse direction: from management applications to enablers that make the hybridization of the physical and digital world possible.

Management applications

Intra and intercompany

These enablers process the information obtained from the first two enablers and apply intelligence to make use of this information. There are three types of management applications that are especially relevant to the industry: business solutions, intelligence and control solutions, and collaborative platforms.

Business solutions, in turn, are classified into four groups: supply chain, commercial, financial, and human resources.

Hybridization of the physical and digital world

These technologies make it possible to connect the physical world with the digital one, capturing information from the physical world (through sensory or social networks), or transforming digital information into a physical element (through 3D printing or virtual reality). There are enablers that make this relationship possible in a bidirectional sense (through advanced robotics or embedded systems).

Within the hybridization of the physical and digital world we find additive manufacturing (3D printing).

7

Past. Present. Future **Industrial sector**

Additive manufacturing is characterized by making the parts based on the superposition of layers of material. It is not a single technology but encompasses different technologies that vary depending on the material, how it is supplied and its state (solid, powder, liquid...) as well as the energy source. In all of them there is a digital file that a machine (3D printer) is able to read and transform into a real part by adding material layer by layer.

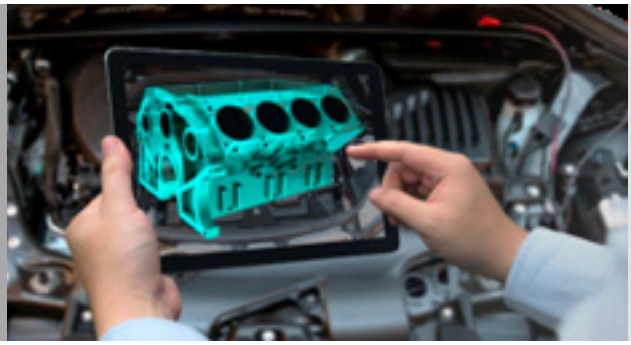
> *Meltio [...] is it much cheaper technology, but much faster, more flexible and, also, more efficient than previous technologies.*

The industrial sector comprises a great diversity of companies with different needs and priorities. The ability of additive manufacturing to adapt to this heterogeneity means that this technology is of great interest to a wide range of industrial companies. There are implementation barriers for the different technologies used in metal additive manufacturing, Meltio solves some of the problems that commonly present, not only is it much cheaper technology, but much faster, more flexible and, also, more efficient than previous technologies.

3 OBJECTIVES OF THE INDUSTRIAL SECTOR

1. Streamline manufacturing of customizable parts

One of the paradigms of industry 4.0 is to focus the product on consumer demands, the consumer is not the one who must adapt to the products, but rather these must be customized to the different consumers.



2. Production flexibility

The diversity of companies in the industrial sector, the need for adaptation and innovation in their designs and competition create an imperative need for flexible manufacturing systems. The industrial sector requires manufacturing systems that can be adapted to different products and that can be combined with traditional manufacturing methods, thus allowing great flexibility in the sector.

All this is about to change!

Metal 3D printers will consolidate production lines, shorten the supply chain and customize production. The products can be adapted to local needs and tastes. The flexibility of additive manufacturing allows the ability to manufacture a much wider variety of products produced by the same machine.

3. Reduction of supplier dependencies

The third industrial revolution or scientific-technical revolution generates capacities never seen before in the industrial sector. Knowledge and data become the pillars of this revolution, allowing the redirection of manufacturing to areas that had been de-industrialized. Additive metal printing is one of these technologies that will mark Industry 4.0.

4. New products

Additive manufacturing generates a new world of possibilities, through design and manufacture of innovative products in an increasingly competitive and global industry that seeks new differentiating solutions. Metallic 3D printing allows optimizing the dimensioning of parts and reducing the number of assembly operations, improving or creating new features for products. This type of additive manufacturing allows you to overcome difficulties and unleash the creativity of engineers.

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COMPONENTS OF THE INDUSTRIAL

The components that we can find in the industrial sector are practically infinite, with different characteristics, applications and requirements. The industrial sector demands and offers a multitude of components and products.

Additive manufacturing can reduce the number of parts and pieces in percentages never seen in the industry

5

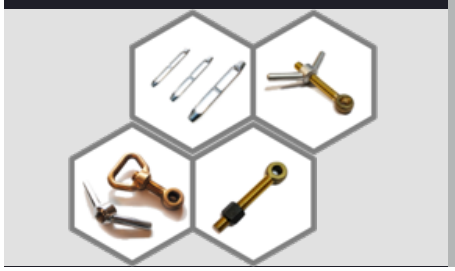
TYPOLOGY OF INDUSTRIAL PARTS

Since the first artisans, the industry has generated a multitude of different manufacturing systems, always showing the need for adaptation and innovation, systems that in some cases were out of date and in others were updated and improved. Within the multitude of manufacturing systems, the most prominent traditional systems if we focus on the substitution or combination of these with additive manufacturing systems are:

01 Machining

By means of different subtractive material techniques, a multitude of industrial components are made, it is one of the methods most used today, allowing finishes and precision unattainable by other manufacturing methods. One of the most significant disadvantages is the waste of material, which depending on the material is a key factor in the choice of the manufacturing method.

02 Forging



Forging is the oldest method of forming metal. Forging makes it possible to produce a large number of the same products, but they require further treatment.

Fuente: https://aesa.es/work/naval/

03 Stamping

Metal stamping or stamping is a type of manufacturing process by which a metal is subjected to a compression load between two molds. The main advantages of stamping in the industry are given by facilitating that the resulting parts can have complex shapes, there is a great variety of materials that can be worked with, and the production of a high number of parts has a low economic cost and labor. In addition, the surface finish is satisfactory, although it can be further processed to improve properties.

Instead, it has a number of disadvantages, highlighting the fact that the thickness of the part may be limited. Furthermore, it is a process with several operations and phases.

04 Casting

The casting and molding process is a procedure to manufacture parts without loss of material and is carried out by melting the material and pouring it into molds that reproduce the shape of the part. It is also known by the name of casting and is mainly applicable for the manufacture of metal parts, plastics, glass, cement, etc.

The mold is a container that has a cavity into which a material in the molten state is introduced which, when solidifying, takes the shape of the cavity. Then it is allowed to cool the necessary time until it solidifies and is removed from the mold. The molds, in general, consist of two pieces, perfectly coupled.

By means of this method we can manufacture and obtain parts of very different shapes, being widely used in the field of product containers and machine housings.

Molding or casting is the process of manufacturing parts, metal or plastic, consisting of raising the temperature of a material until it melts and introducing it into a mold, with the shape we want to obtain, where it solidifies.

05 Cutting / folding

The cutting and bending of sheet metal are two of the fundamental processes in the manufacture of industrial machinery. There are different sheet metal bending methods that are more or less suitable depending on the type of piece we want to make.

Bending and curving are sheet metal shaping processes that are carried out by cold deformation of the material, and in which a piece with a developable surface is obtained from a flat sheet (which can be extended or opened on a plane) with one or more folds.

The difference between bending and bending basically resides in the value of the bend radius of curvature, greater in bending.

6 MATERIALS USED IN THE INDUSTRIAL SECTOR

The materials used in the industrial sector are very varied, with the aim of taking advantage of the advantages, qualities or peculiarities that each one of them can offer. Generally there are products, components in which elements of different nature are combined.

In general, the main reasons that justify the existence of different materials in the manufacture are to reduce the manufacturing cost and improve the characteristics of the set. Among the materials currently stand out:

1. Composite materials

Composite materials are of great interest in the industrial sector due to their excellent properties, including the stiffness-to-weight and strength-to-weight ratio. The environmental effects generate repercussions in composite materials, which are generally less than in metallic materials.

2. Plastic materials

"Plastic" is the common term to describe a wide range of synthetic or semi-synthetic materials that are used for a huge number of applications. Plastic is an immensely versatile material, ideal for a wide range of consumer and industrial applications. The relatively low density of almost all types of plastics gives plastic products the benefit of lightness. They are resistant to corrosion from many substances that attack other materials, making them durable and ideal for use in very demanding applications. They can be easily molded to complex shapes and allow the integration of other materials to form ideal products for a wide range of functions.

3. Metallic materials

"The metallic alloys are receiving a new impulse thanks to the metallic additive manufacturing, since they allow to obtain parts with the benefits of plastic and composite materials and with the advantages of metallic ones."

Ferrous alloys

Ferrous alloys are classified on the basis of their carbon content in steels and cast iron. Within these two great families we find a multitude of materials with very varied characteristics and applications. This make ferrous alloys the most widely used metal alloys in the industry.

Aluminum

Aluminum alloys are the second most used metal alloys in the industry, they are used in practically all sectors. Among its qualities, its resistance to corrosion and its low density stand out. Aluminum alloys are known as light alloys due to their low density, which allows the manufacture of light parts. In addition they are easily machinable and inexpensive alloys.

Titanium

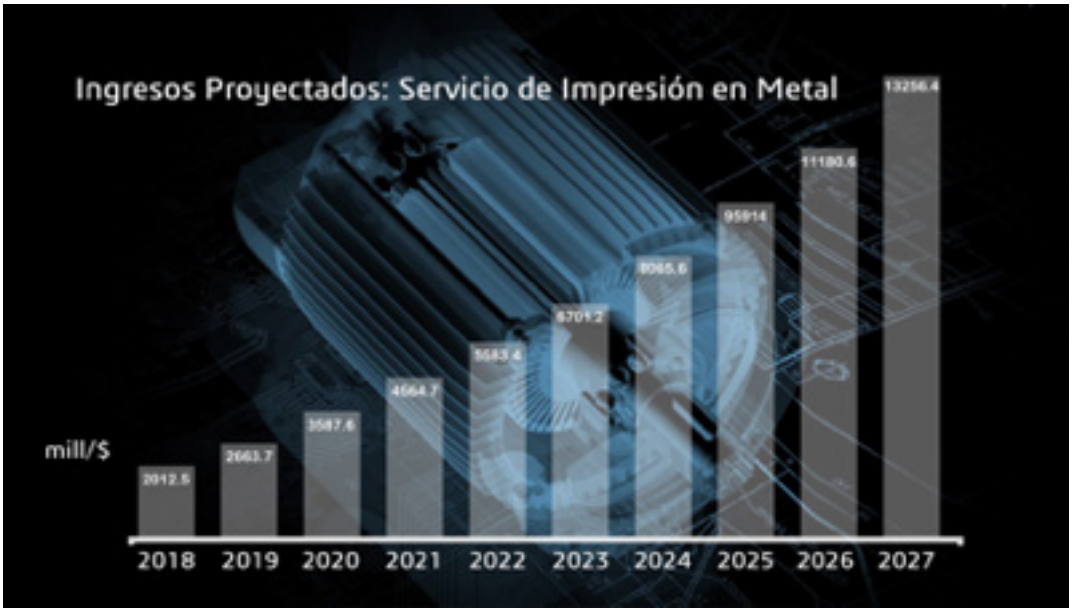
It is a transition metal that forms alloys with unique characteristics that combine high hardness, high melting and boiling points, low density, and are particularly good conductors of electricity and heat.

New alloys

The demand of the industrial sector between mechanical performance, cost, life of the material, maintenance, etc., implies a continuous search for new materials and compounds. In this sense, new alloys are currently being constantly developed with the aim of improving any parameter that offers a differentiating value and generates a competitive advantage.

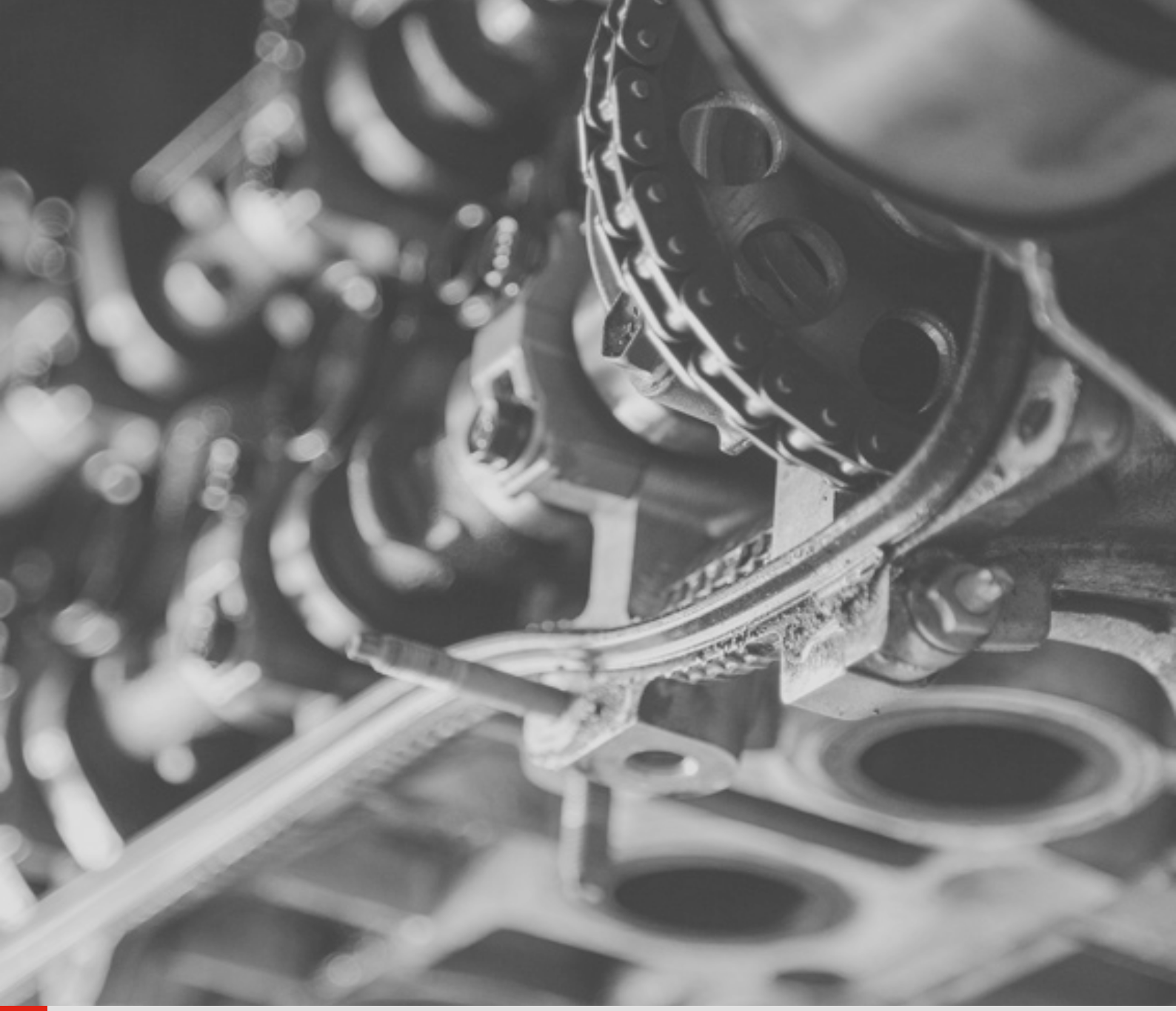
The industrial sector has been one of the great drivers of 3D printing due to the adaptability of additive manufacturing to a multitude of industries.

Project Investment Growth Expected for US Metal 3D Printing Market 2018-2027 (in Millions of Dollars).



In recent times, additive manufacturing is showing its potential thanks to the inclusion of new machines and materials.

Metallic printing has been a technological challenge in this industry, as the technology classically presented four barriers: size, time, cost of production, and materials that are currently being torn down.



ADDITIVE MANUFACTURING IN THE INDUSTRIAL SECTOR

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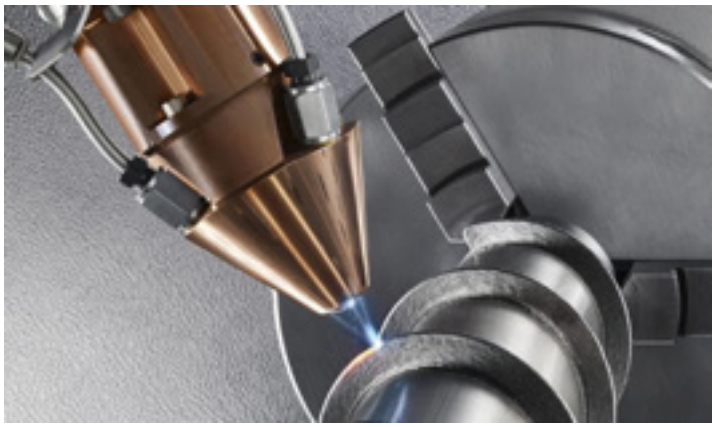
The industry is looking to expand the potential of these machines to the widest range of possible materials. And among all of them, there is one that stands out as especially valuable for the industrial industry: metal. Metal 3D printing allows you to create lighter and stronger parts with complex shapes, impossible to achieve with conventional metal fabrication methods.



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ADVANTAGES

Topological optimizationa

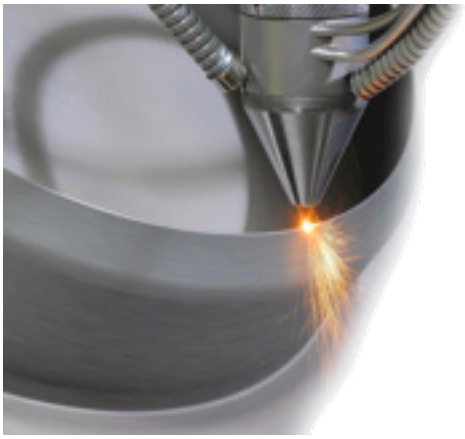
Topological optimization in 3D printing allows the engineer to design by focusing on the needs of his project, be it cost reduction, complex shapes, strength, heat dissipation, etc. This allows to obtain parts that by other manufacturing methods would be impossible, obtaining more efficient designs or totally disruptive products.

Manufacture of complex preforms

Obtaining complex preforms drastically reduce machining times and avoid wasting large amounts of material. This combination of additive and subtractive methods is known as hybrid manufacturing, presenting itself as one of the most promising alternatives.

Use of new materials

The search for materials with increasingly specific properties for a certain part, or the constant study of new metal alloys that offer high resistance to stress and reduced costs, have led to the obtaining of new metal alloys that are being used in the industry.



One of the great advances in metal additive manufacturing is the versatility to use a wide variety of materials, adapting to the most suitable material for each project.

The inclusion of new materials in the design of parts in the industrial sector, allows the current redesign towards parts that are much lighter, more resistant and optimized for the final application.

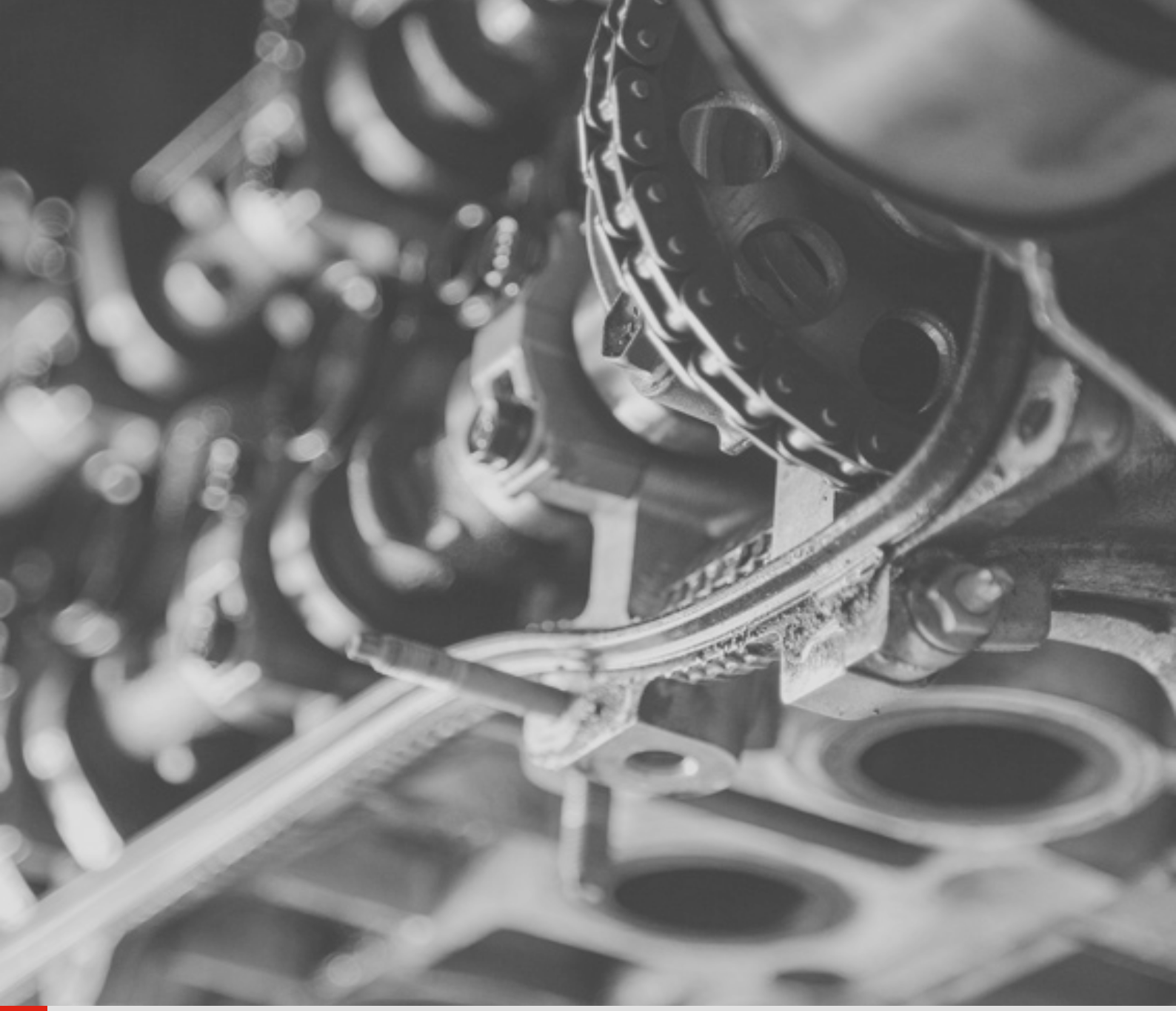
Customization at its fullest expression

Additive manufacturing allows you to create products like never before. By allowing to produce complex shapes inaccessible until the irruption of this technology, in an individualized way with unique characteristics or shapes, this ability to produce complex and topologically optimized shapes generates unique products.

Mold printing

Regarding the manufacture of molds through additive processes, there are two relevant points:

- Reduction of mold production costs due to the reduction of the material used and of machining
- Improvement of cooling systems through optimized shapes and hollow interiors in complex molds.



NEW TECHNOLOGIES. NEW APPLICATIONS

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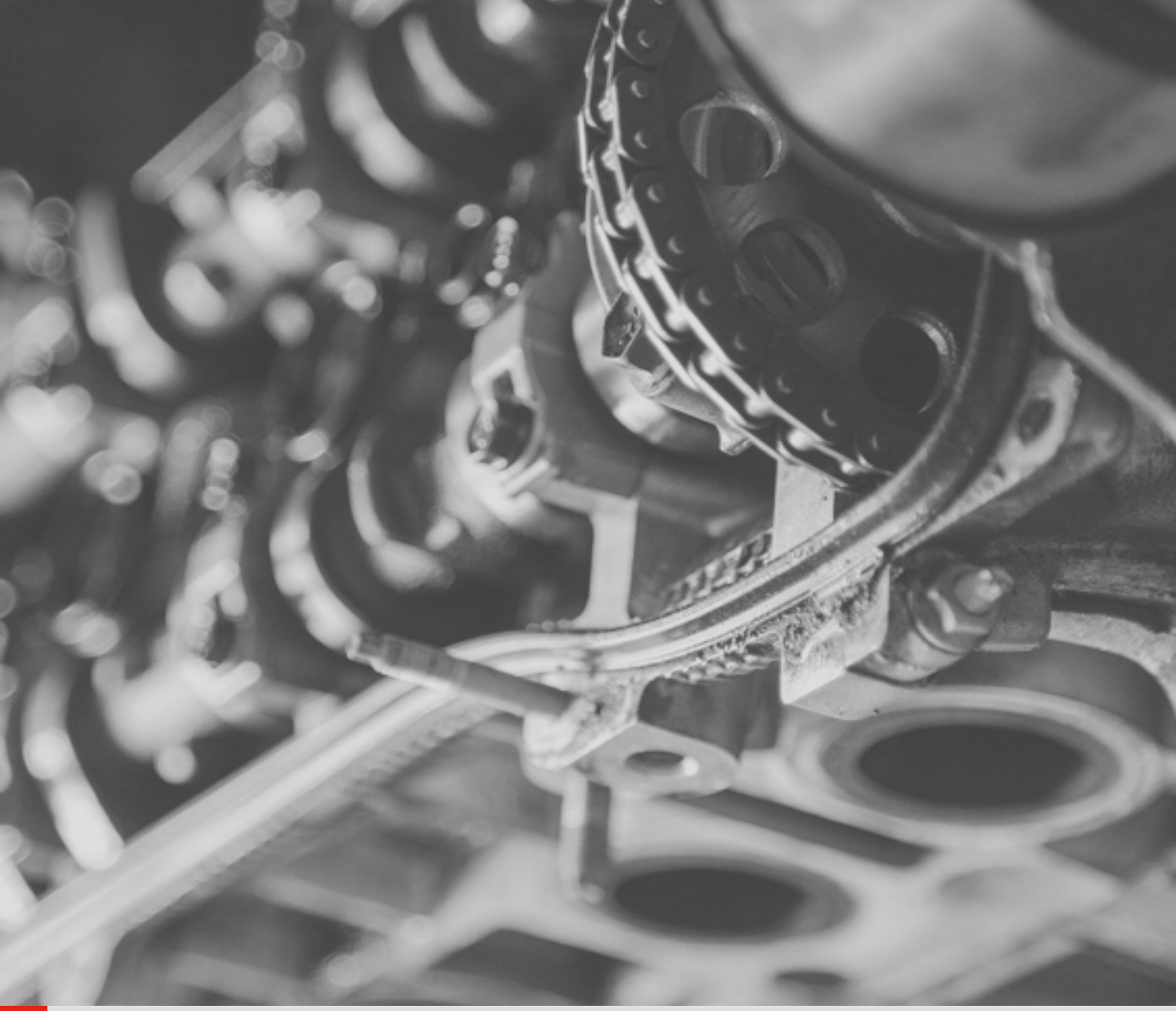
Hybrid manufacturing

Hybrid manufacturing, which consists of the combination of additive and subtractive methods, is demonstrating an extraordinary feasibility and flexibility of these systems.

Manufacture of final parts

Using additive methods, small parts to large volumes can be designed using metal 3D printing. The industrial sector can benefit from metallic additive manufacturing in a multitude of components and products.



IN MELTIO WE RESOLVE YOUR DOUBTS

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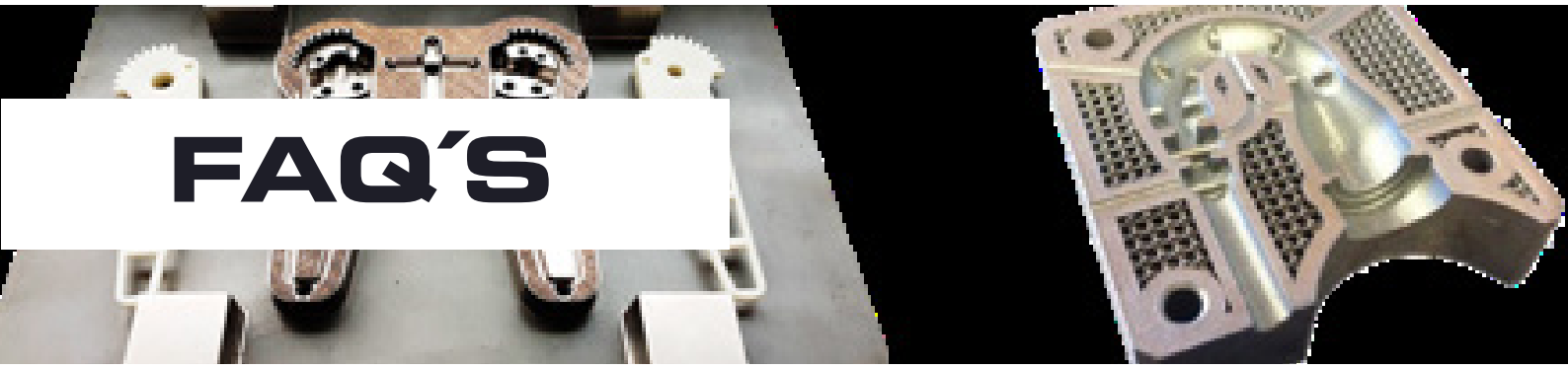

FAQ´S

What skills do I need?

Is my sector updating?

What value do I bring to my clients?

Why don’t they buy from me?

Does it fit my facilities?

Could I improve my business?

Could you generate new business?

Customization, is it a future option for me?

Technology, is it flexible?

Can I pay it off with financing?

What training do I need?

Can we make that transformation?

MELTIO

3E METAL DEPOSITION TECHNOLOGY

Linares · Jaén · SPAIN
(+34) 953 88 80 89
info@meltio3d.com