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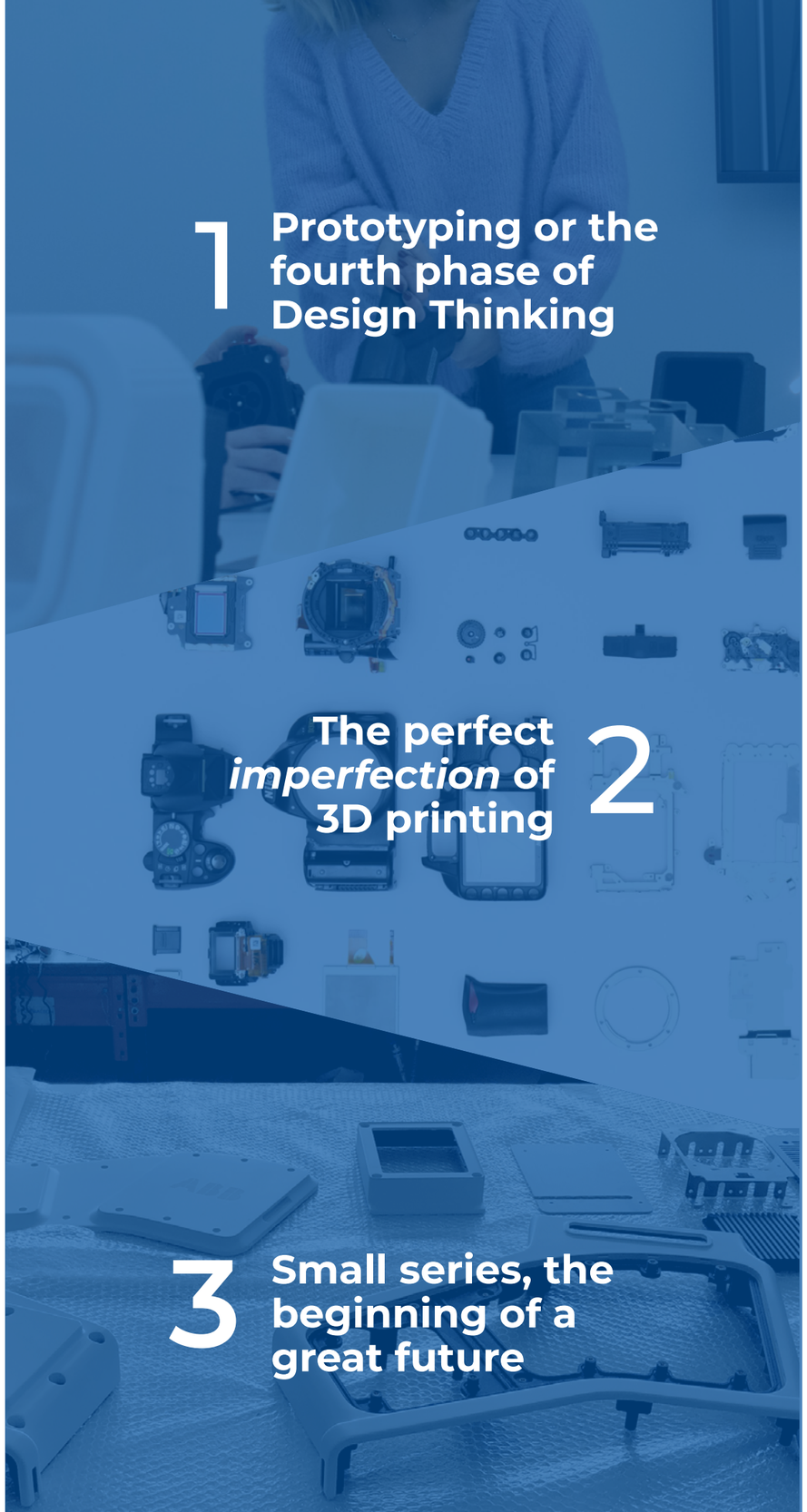
Advanced manufacturing

bigD



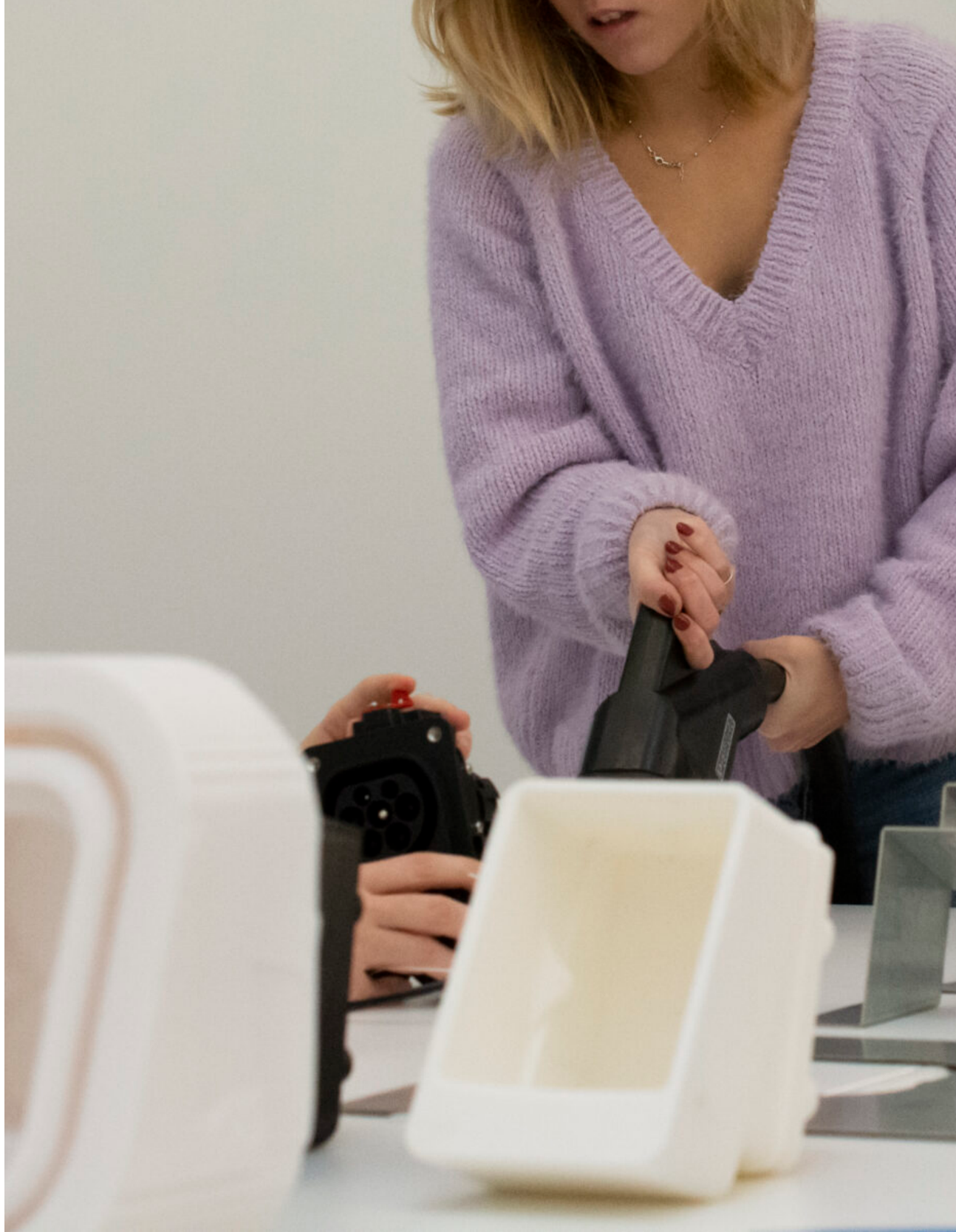
bigD
Design
that matters

1 Prototyping or the fourth phase of Design Thinking

Design Thinking is a methodology that makes the most of “small data”. It offers qualitative-oriented data and provides small “insights” that will help us discover opportunities and turn them into innovative services or products. To do this, these five steps should never be lacking in design thinking: empathize, define, ideate, prototype and evaluate.

“Design Thinking has the ability to enhance people’s creativity and thus improve processes”. And it is that this phrase by Jeanne Liedtka in her 2018 article “Why design thinking works” for Harvard Business Review is the key.

Put in context, we are going to **stop at the fourth phase, prototype.**



“Design Thinking has the ability to enhance people’s creativity and thus improve processes”.

And more carefully in industrial prototyping, since it is one of the most widespread tools before making a product a reality. That is to say, the ideas are grounded and become tangible so that they can be touched and not remain in the user’s imagination. It consists of reproducing the final product that is intended to be launched on the market. But be careful not to confuse prototype with design. And also, sometimes, it is not given the necessary importance and here is the key point to obtain a better product because you learn much faster from failures because it is tried and tested so that the modifications are almost immediate.

For companies that operate with agile methodologies, focused on innovative processes or the development of technologies, prototyping is something integrated that is part of their DNA.

“Everything starts with an inspiration. A new idea begins to mature. An idea that begins the path to success begins to take shape”.

With prototyping, short and iterative processes are sought with little cost, so that through “feedback”, they allow us to adjust more and more to the satisfaction of the needs and desires of the users.

“Fail fast to hit as soon as possible” would be the summary phrase. We see that thanks to prototyping we make the way of working be that of executing to think. There are many ways to prototype, from the fastest and simplest to others that involve more cost and time. The use of one or the other will depend on the team and the project in which we find ourselves, but basically, the main idea is to be able to identify failures or defects in this phase and, at the same time, evaluate aspects such as the viability of its materials, its usefulness or its functionality before proceeding with its final validation and verification.

And they are aware of this at Wehl & Partner, the prototype company where your product will be born thanks to the different solutions they offer to make your idea come true.

We also found studies on how to “think with your hands” as it generates new types of connection in the brain that can inspire new ideas on top of the old ones.

And to help think, 3D printing is currently used for the manufacture of prototypes. But beware! It must be considered which technology is the most appropriate. Each one has advantages and disadvantages, so it is necessary to know how each one works and its limitations in order to find the most suitable one for each need.

Another important point is that, initially, three-dimensional printing was only used for the **manufacture of prototypes.** Now, it is also used as **another manufacturing method.**

We are certainly seeing a breakthrough in 3D printing for both prototyping and manufacturing. Even engineers at the University of Cambridge are already working on smart 3D printers that can quickly spot never-before-seen errors in designs or unknown materials, just by learning from the experiences of other machines.

As Roger Van Oech said:

“It is not possible to solve today’s problems with yesterday’s solutions”.

2 The perfect *imperfection* of 3D printing

In recent years, 3D printing has proven to be one of the most important trends in industry 4.0. **Three-dimensional printing** is revolutionizing all sectors. An agile and flexible technology that **drives digital transformation** and promotes sustainable practices.

According to the report made by Ultimaker, "3D Printing Sentiment Index 2021", **3D printing is increasingly recognized by organizations,** since 54% of companies surveyed (12 countries) say that this technology will become a priority when it comes to investing throughout the following years. In addition, the percentage of companies that use 3D printing has increased, growing to 39%, about four percentage points more than in 2020.

As if it were a Greek sculpture, between proportion and balance, the result of 3D printing makes this technology rise as the new creator, capable of printing both perfection and the desired imperfection. The new Michelangelo has arrived. Virtually in the not too distant future, with information in a digital file, you can print anything you can think of and turn it into a tangible object in a matter of hours and any imperfection will be the fault of human imperfection.

According to the well-known Gartner curve, which represents the maturity, adoption and commercial application of a technology, 3D printing has reached maturity very quickly. And it is that there are already many industries that are choosing to use professional industrial 3D printers, among which we have to highlight: 3D printing in medicine, in points of sale and in supply chains.

This type of printing has many significant advantages over traditional manufacturing methods because it helps the industry reduce costs (especially in small production runs it is the most cost-effective option), increase productivity, and change the way new ideas are tested. Flexibility in the process is the key in the development of many products at an industrial level until a perfect model is found and ready to be industrialized.

One point to highlight, within flexibility, is the great responsiveness of 3D when faced with the need to massively customize some products. In addition,

“Investment in 3D will increase throughout the following years”.

print on demand will be able to reduce both a company's inventory and its warehouse, which allows a reflection on business models and the options it brings to supply chains. Large surfaces disappear because a 3D print with the same mechanical and physical characteristics can be made anywhere.

It also has a potential market in the **reproduction and manufacture of spare parts,** that is, intended for parts of products that are no longer manufactured or when the manufacturer has a very small stock.

The **automotive sector,** Toyota, has created scale engine models for vehicles, being able to print pistons, a crankshaft or valves, and Volkswagen, for example, going beyond mere 3D printing for those famous prototypes that dazzle us in salons of the automobile, sees the manufacture of parts for its classic vehicles as a potential market.

Although we have seen solutions that are a reality, there are also tests underway to further accelerate and refine the 3D world. Although still in testing, the "meta-bots", named after their creators at the University of California, are a new army of mini robots, which can be launched as soon as their printing process is complete. Currently, their size is similar to that of a coin but they are designed to scale

them and make it the new way of manufacturing AGVs / AMRs.

Once this technology has been modeled and addressed, we leave you to reflect on the subject of the materials used in printing. Because the ideal of aesthetics and contemporary digital perfection has been reached, the result of the union of research and the "imperfections" already designed, the intrinsic characteristics of the materials become a fundamental component for the work.

Will imperfect humanity be able to manufacture perfection? Or will artificial intelligence lead us to that perfect design and impression?

"The least you can asked for a sculpture is that it doesn´t move".

Salvador Dalí

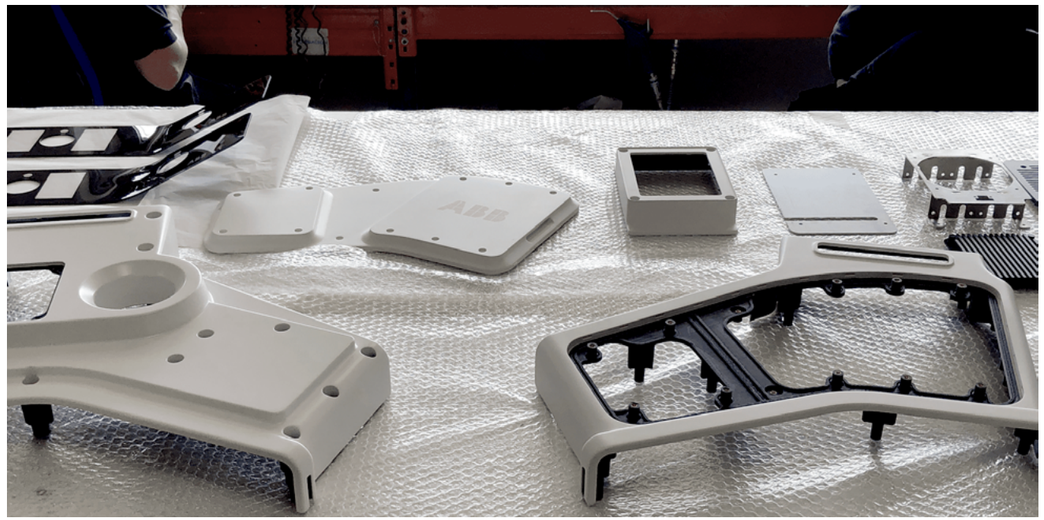
3 Small series, the beginning of a great future

The manufacture of short series is focused and is recommended when the product must be on the market for a short period of time, when it is the first version of a new idea or concept or even an evolution of a previous version and even customization.

Previously, rapid prototyping technologies such as 3D printing and 3D machining are useful for validating visual and mechanical concepts. But once this prototyping stage is completed, it is necessary to move on to a new stage with a pre-industrialization or industrialization phase to implement a project. The requirements may vary depending on the case and this type of series is called short series. The idea is to produce parts in small series with reduced manufacturing times and costs.

Additive manufacturing technologies are an effective solution for the manufacture of small series and final parts because they are economically viable techniques compared to other manufacturing methods. Additive manufacturing is a new concept of industrial production where the material (plastic or metal) is deposited layer by layer in a controlled manner. In addition, it is very useful in the manufacture of prototype molds for conventional production processes, such as injection, blow molding or thermoforming. Using this 3d printing technique, custom shapes can be produced according to needs with great millimeter precision.

According to 2021 Markets and Research report, the global additive manufacturing market is forecast to grow rapidly from 2022 to 2028 and according to the study published by the con-



sulting firm Context, sales of industrial and design 3D printers increased by 7% and 19%, respectively. Representing 69% of total revenue for the first quarter of 2022.

The high requirements demanded for the production of prototype molds for small series are a great challenge, but thanks to this type of manufacturing spectacular results are achieved.

For example, additive manufacturing in metal can be carried out using various technologies, such as Selective Laser Melting (SLM), Powder Bed Fusion – Laser (PBF-L) or sintering. by direct metal laser (Direct Metal Laser Sintering, DMLS).

In the specific case of SLM technology, it is a type of metal additive manufacturing that can work with a wide range of metals. The final result has properties equivalent to parts manufactured using traditional manufacturing processes with densities close to 100%.

3D printing has positioned itself in a short time as a real and effective alternative, to complement the manufacture of small series. The advantages are vast.

The great diversity of materials that can be used with this technique guarantees surprising results and, furthermore, the mechanical characteristics of the parts are the same as those that can be found in parts injected by traditional moulds.

“Sculpture is the art of intelligence”.

Pablo Picasso

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