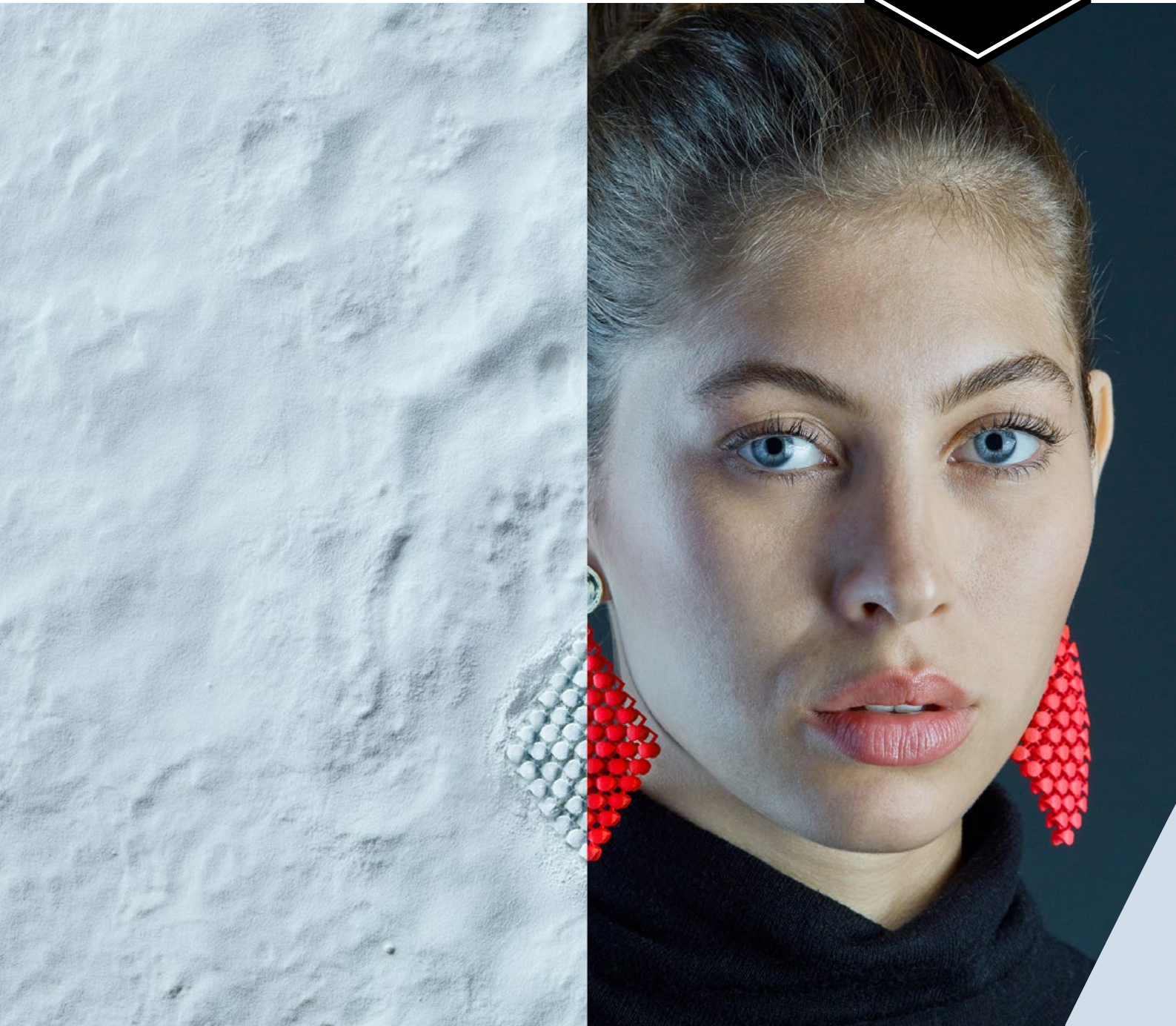


# CASE STUDY **BOLTENSTERN**

3D-printed jewelry: how white polyamide powder is turned into colorful designer pieces

**DYE**  
**MANSION**



  
**BOLTENSTERN**  
since 1964

In the lifestyle sector 3D-printing offers the possibility of customizing pieces and creating unseen shapes. Find out more about the exciting transformation of white polyamide powder into the colorful, eye-catching Fabnora earrings by the high-fashion jewelry manufacturer BOLTENSTERN.

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## ABOUT BOLTENSTERN

The first premium jewelry manufacturer  
to produce 3D-printed collections

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The name Boltensstern has stood for high-quality jewelry for more than 50 years, unusual designs and the finest handcraft in noble metals. Through his precise and skillful handling with gold, founder Sven Boltensstern established a reputation for designing luxurious & sculptural gold jewelry for European royalty and Hollywood stars in the 1960s.



Sven Boltensstern with a client | © BOLTENSTERN

Since 2015, a fresh, completely different wind is blowing. His daughter Marie Boltensstern has been guiding the family business in a new direction since then. Anyone visiting her showroom opened in 2017 in Vienna, Austria (Bräunerstraße 11) will notice this.

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**My customers appreciate the variety of the collection. Many different colors, different sizes and ear studs optionally available in silver, gold or rose gold.**

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Marie Boltensstern, CEO & Head of Design BOLTENSTERN



„3D-printed fine jewelry“ is BOLTENSTERN's slogan today. All of the young designer's collections are now produced using industrial 3D-printing and hand-forged elements. Her jewelry is inspired by the forms of nature. When designing her collections, she follows the bionics - transferring natural phenomena into technology. During her architectural studies, the young entrepreneur already focused on digital manufacturing and 3D-printing technologies. When she heard of the first precious metal printer by Cooksongold and EOS in 2014, she was thrilled and saw great potential in combining her passion for modern technology with the design of jewelry.



In the BOLTENSTERN Showroom in Vienna, Austria



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## THE CHALLENGE

The transformation of a plastic part into a designer piece

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BOLTENSTERN has always worked with polyamide - previously only for the prototyping of new structures. When working with polyamide, the company quickly realized that the material was also suitable for series production because of its good properties. In order to offer her customers as much freedom of choice as possible, BOLTENSTERN planned to launch the earrings in different sizes and colors.



In first experiments with the Laser Sintering technology (SLS) the layers from the printing process were visible on the pendants. Also, the thin wall structures broke easily and the haptics of the parts were not as good as the label imagined them for an end-use product.

In terms of the planned color variety, BOLTENSTERN was challenged by the white polyamide powder, which requires a coloring of the parts. So they were looking for a solution to color the small-scale and flexible plastic parts. **The goal: To achieve improved haptics of the earrings and offer different colors that reach every part of the earring - in a skin-friendly and reproducible way.**

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“ From the beginning it was very important to offer various sizes and colors to my customers - all with the same quality. ”

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Marie Boltenstern, CEO & Head of Design BOLTENSTERN



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## THE SOLUTION

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With the right partners and know-how on finish and color to high-value jewelry pieces

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The jewelry manufacturer found the solution to these challenges in cooperation with the German 3D-printing service provider FORMRISE, a DyeMansion production partner from the very beginning. FORMRISE uses our Print-to-Product workflow onsite at their production for many years. The solutions for automated cleaning, surface treatment and coloring can be used flexibly for all common 3D-printing technologies in the field of plastics, regardless of the part geometry. The team around Peter Spitzwieser and Robert Razavi has a lot of experience with high-end consumer goods and knows what is important for designer pieces. FORMRISE advises BOLTENSTERN on the optimization of their CAD models, the correct positioning of the parts and the selection of the appropriate 3D-printing technology.

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**With the technology of DyeMansion and our know-how, we provide Boltenstern with a stable, reproducible and above all holistic process.**

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Robert Razavi, CEO & co-founder FORMRISE

### Print-to-Product workflow

1



#### CLEANING POWERSHOT C

First the parts are being automatically cleaned from the powder in the Powershot C.



3-10 minutes

2



#### POLYSHOT SURFACING POWERSHOT S

PolyShot Surfacing (PSS) provides a semi-glossy & scratch-resistant surface. It is key for maximum coloring results.



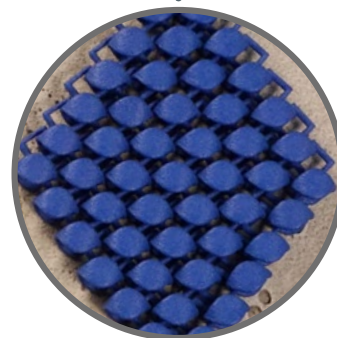
5-15 minutes

3



#### DEEPDYE COLORING DM60

During the DDC in the DM60, the dyestuff penetrates the part and evenly dyed, high-quality parts are being created.



2,5 hours





The polyamide earrings are produced at FORMRISE on a Formiga P 110 from EOS. The raw parts are then automatically cleaned in the DyeMansion Powershot C. The Powershot S gives the parts an improved feel and a semi-glossy look with PolyShot Surfacing (PSS). **The mechanical process takes 10 minutes and does not remove any material compared to tumbling.** The pendants are then colored with the DeepDye Coloring (DDC) process in the DyeMansion DM60. The process provides users with ready-to-use color formulas down to the microgram. This enables an industrial process that could not be easier for the user and can be reproduced any time.

The power lies in the color cartridges, which are manufactured depending on base material, finish and desired color. Based on the volume of the parts, four cartridge sizes can be delivered. These are equipped with an RFID chip that transfers all process parameters QM ready to the DM60.

Back in 2017, the Fabnora collection launched in eight colors. **Now the collection has a range of about 20 different colors. Hardly any 3D-printed product offers the customer more color variety.** It includes 10 standard colors and 10 colors that vary from season to season. The collection can be supplemented with other shades at any time. These can be ordered from our ready-to-use color database. For the sale, BOLTENSTERN gives the colors their own names. For example, „RAL3022“ becomes „Salmon“.

**Trend colors can be developed individually with our Color Matching. A good example is a limited edition in the official Pantone color of the year, Classic Blue. Read more about our Color Matching on page 7.**

PANTONE CLASSIC BLUE



Color range of the Fabnora collection



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## THE BENEFITS

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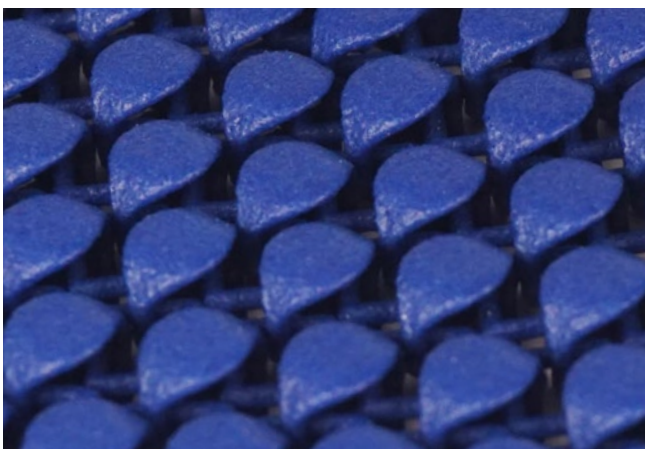
The ability to think and produce products in a completely new way

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- ✓ EFFICIENT SURFACING FOR END-USE PARTS
- ✓ VALUE INCREASE THROUGH FINISH & COLOR
- ✓ MAXIMUM FLEXIBILITY WITH 180 POSSIBLE COMBINATIONS
- ✓ FAST REACTION TO COLOR TRENDS

### EFFICIENT SURFACING FOR END-USE PARTS

For initial tests a tumbling process was used to treat the surface, often resulting in damaging individual earring parts. In a direct comparison, the single use of the DyeMansion PolyShot Surfacing (PSS) process with the Powershot S ensures a homogeneous and semi-glossy surface, which is pleasant to wear on the skin. The process takes only 10 minutes and does not affect the part's geometry. **The result: the risky tumbling process is not needed for this product, which also leads to reduced costs.** The pores are closed during PSS. The result is a significantly improved, uniform surface. This is particularly important for the dyeing of the parts. The dyes are taken up much more homogeneously from the base material.



PolyShot Surfacing provides a semi-glossy look

### VALUE INCREASE THROUGH FINISH & COLOR

BOLTENSTERN sells the earrings in combination with elements made of sterling silver for 140€. Only by using the right finishing and coloring technology, 3D-printing can be used for more than just prototyping purposes. The DyeMansion Print-to-Product workflow combined with FORMRISE's expertise ensures an optimum surface quality and reproducible processes. **The DyeMansion technology contributes significantly to the value of the plastic parts and thus to high-quality and salable pieces of jewelry.**



### MAXIMUM FLEXIBILITY WITH 180 POSSIBLE COMBINATIONS

**If you calculate the available 20 colors, 3 sizes and 3 different ear studs, you get 180 possible combinations.** BOLTENSTERN can thus offer its customers maximum individuality. Depending on mood, occasion or outfit, the earrings can be combined in different ways. On their web-site, the brand also offers advice on how best to combine which outfits and styles. The use of 3D-printing technologies makes it possible to think and create products in a completely new way. Thanks to the precision of a Formiga P 110, fine, flexible structures that could not be made by hand can be produced without problems and in one piece. By using 3D-printing and our Print-to-Product workflow, the label can launch products not only quickly, but also in an unusual variety.

## FAST REACTION TO COLOR TRENDS

From the very beginning it was important for BOLTENSTERN to be able to react quickly to the needs of customers and market trends. A good example is the official Pantone Color of the Year 2020, Classic Blue. With the help of our Color Matching service, the color was quickly developed for a limited edition in Pantone Classic Blue.

For the development we used a physical sample of the color, in this case an official Pantone color fan. The Pantone color code was scanned with a spectrophotometer (1). The tailor-made recipe was specially developed for the use of EOS PA 2200 with PSS (PolyShot Surfacing) finish (2). For a final check of the recipe, the samples were compared to the original reference (3). From now on the exact color formular can be reproduced at any time, place and for any batch size in the DM60 (4).

1



2



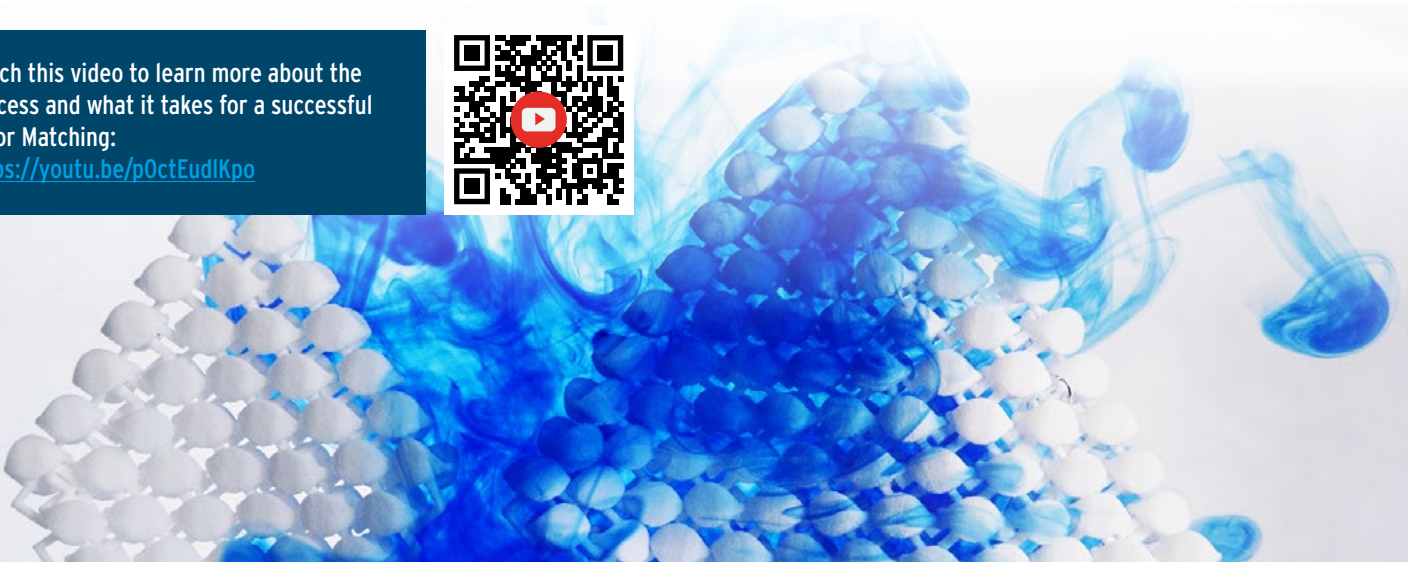
3



4



Watch this video to learn more about the process and what it takes for a successful Color Matching:  
<https://youtu.be/p0OctEudIKpo>







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## WHAT'S NEXT

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As the Fabnora collection has proven itself, Marie Boltenstern plans to expand the collection. These include other colors, possibly even individually desired colors that the customers can choose. An idea that can be easily realized with DyeMansion Color Matching.

The designer even finds jewelry appealing that combines metal and polyamide 3D-printing. In any case, there are no limits to Marie's ideas - thanks to the innovative technologies used.

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**Our goal is to integrate innovation into every aspect of the jewelry business: From the design to the buying experience of our customers.**

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Marie Boltenstern, CEO & Head of Design BOLTENSTERN



Find out more about the project in our Coffee & Cases Interview with Marie Boltenstern:  
<https://youtu.be/OoJUS1GYGa8>





# TRYMANSION - TRY OUR TECHNOLOGY FREE OF CHARGE

Not familiar with DyeMansion technology yet? Feel free to test our finishing and coloring solutions with your own parts. Contact us for your first, free benchmark.



## YOUR SAMPLES

Send us your non-depowdered parts that were agreed with our team.

## CHOOSE FINISH

Choose between PolyShot Surfacing (PSS) or VaporFuse Surfacing (VFS). Our [guidelines](#) answer open questions and help to choose the right finish.

## CHOOSE COLOR

Following the surfacing process of your choice, the parts in the DM60 are dyed in your desired color. Click [here](#) for color options.

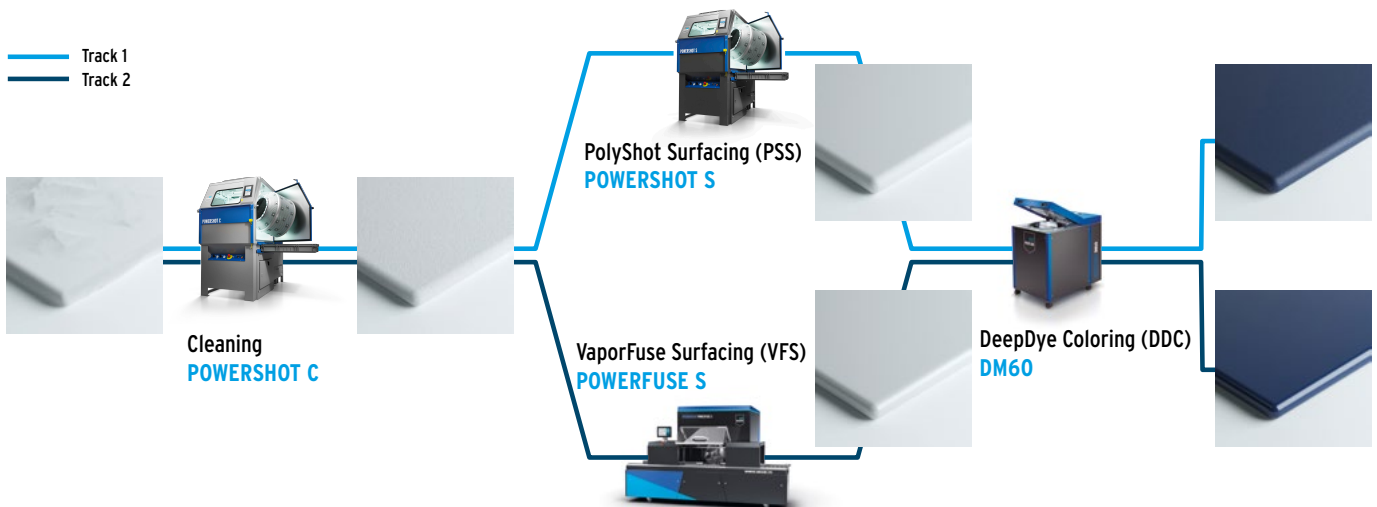
## GET SAMPLES

Receive your finished parts. Delivery date depends on scope of delivery and location.

### ① CLEANING

### ② SURFACING

### ③ COLORING





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