

# Chabloz Orthopédie leverages HP 3D Printing to improve treatment of cranial deformities



With HP Multi Jet Fusion technology, **Chabloz Orthopédie** has digitized its entire treatment process to provide more efficient treatment solutions to patients and their families



Data courtesy of Chabloz Orthopédie, Group Ottobock

## Introduction

Chabloz Orthopédie specializes in custom-made prosthetics, orthotics, and large orthopedic devices such as lower and upper limb prostheses for daily life or sports; myoelectric prostheses; helmets for babies with plagiocephaly (flat-head syndrome); and other such devices. The Chabloz group is dedicated to developing these devices by incorporating new technologies and research and development for new products.

Chabloz works closely with rehabilitation specialists in regions throughout France to develop the best functional orthopedic solutions for patients and their families. Owned by German

prosthetics company Ottobock, Chabloz is able to expand its product reach to more French locations as well as other locations around the world.

The Chabloz “Patient Journey” encompasses the entire treatment process, from the first appointment to fittings and check-ups to closely monitor progress.

For the past 15 years, the company has been exploring new manufacturing techniques to eventually transition to digital production processes.

### • Industry

Healthcare

### • Sector

Orthotics and prosthetics

### • Objective

To use a 3D printing orthopedic helmet produced with HP Multi Jet Fusion (MJF) technology to improve the treatment process for babies born with cranial deformations.

### • Approach

HP Multi Jet Fusion technology allows Chabloz to more quickly produce helmets with thinner walls, which eases the modification process throughout treatment and also enhances the comfort of the device on the baby's head.

### • Technology | Solution

HP Multi Jet Fusion technology,  
HP Jet Fusion 4200 3D Printing Solution

### • Material

HP 3D High Reusability<sup>1</sup> (HR) PA 12

1. HP Jet Fusion 3D Printing Solutions using HP 3D High Reusability PA 12 provide up to 80% powder reusability ratio, producing functional parts batch after batch. For testing, material is aged in real printing conditions and powder is tracked by generations (worst case for reusability). Parts are then made from each generation and tested for mechanical properties and accuracy.

## Challenge

Chabloz's first 3D printed product developed from a cranial helmet design to treat plagiocephaly (flat-head syndrome), which can affect infants. Being able to create this device without any design constraints is imperative as each helmet will have different effects on the shape of the baby's head depending on the level of deformity.

Using their previous manufacturing method resulted in fewer than 50 helmets in one year, and complicated thermoforming meant the helmets were thick and heavy, which are not ideal for a baby's delicate head. Chabloz knew they needed a different kind of process, one that would allow for customization, thin material, and a more streamlined workflow, so they turned to digital production with 3D printing.

**"We set out to make the thinnest helmet possible so as to not limit the mobility of the child,"** said Jules Revais,

Product and Process R&D Engineer at Chabloz Orthopédie. **"It's very important that a patient at this age can move because it's when they develop brain and motor skills."**

In April 2017, Chabloz started 3D printing with fused deposition modeling (FDM) technology, initially just for prototyping.

**"We saw the potential and the realization of parts, but we faced some problems with the reliability of the printer,"** Revais said. **"The quality of the parts was good but not homogeneous."**

Chabloz researched other 3D printing technologies to replace FDM.

**"We chose HP Multi Jet Fusion because in our opinion, it was the best machine for our application,"** Revais said. Chabloz brought HP Multi Jet Fusion in house in early 2018.

## Solution

After a quick scan of a baby's head, Chabloz can analyze any deformations and provide the parents with a recommended treatment plan. Chabloz then uses CAD to digitally correct the deformation, from which they construct a 3D printable file, layer by layer, using a CAD sculpting tool.

When the helmet comes out of the HP Jet Fusion 3D Printing Solution (typically an overnight process), Chabloz performs minimal post-processing such as adding a bit of fabric to certain areas inside the helmet to provide extra comfort and an elastic piece on the hinge of the helmet to easily facilitate adjustments throughout the baby's progress.

During the patient fitting, Chabloz uses pressure sensors to determine the amount of pressure applied by the helmet to the baby's head. Once the helmet is the perfect fit, Chabloz staff monitor the progress every one-and-a-half months and continue to make adjustments as needed, for a total treatment period of 3 to 6 or 7 months.

**"Because we are working on the human body, it's very important for us that the material can be modified,"** Revais said.



## Result

In 2018, Chabloz used HP Multi Jet Fusion to print 200 cranial helmets, and in 2019, they produced 500.

**“3D printing helped us improve workflow, which has opened a new market for us,”** Revais said. **“With the classical workflow, it was not possible for us to expand like that within a new market.”**

An overall faster process is not only good for Chabloz’s business, but also beneficial for the patient. In fewer than 24 hours, Chabloz can produce six helmets, or up to nine when printing a full bucket.

**“For this type of treatment, it is really important to be fast because if the patient (baby) had to wait up to one month, for example, the head shape has changed as the baby has grown, which would require a lot of re-fitting and modifications,”** said Revais. **“But with a faster process, not as many modifications are needed.”**

Chabloz also noticed improvements in cosmetics, including quality texture and detail.

**“We can go very thin with HP [Multi Jet Fusion], but still**

**with good mechanical properties,”** Revais said. **“If you can go very thin, you can have some level of flexibility, even with a rigid material.”** Chabloz’s helmets print with a thickness between 1.5 mm and 3 mm, depending on the area of the head that the helmet is treating.

Other cranial helmets on the market feature Velcro as part of the locking system, so when parents remove the helmet for one hour per day and then try to re-attach it later, it’s not always clear how much pressure is applied to the baby’s head. However, Chabloz’s helmet is outfitted with a small elastic closing hinge that follows the growth of the baby’s head.

**“With this solution, parents don’t have the problem of putting too much or not enough pressure on the baby’s head,”** Revais said. **“With elastic, there is always the optimal pressure on the baby’s head. The hinge is something we can only do with HP [Multi Jet Fusion] technology at this level of precision and integration.”**

Apart from cranial helmets, Chabloz also hopes to produce sockets for prosthetic devices, which have been prototyped but not yet produced, as well as lower limb cosmetic covers.

Connect with an HP 3D Printing expert or sign up for the latest news about HP Jet Fusion 3D Printing [hp.com/go/3Dcontactus](https://hp.com/go/3Dcontactus)

Learn more about HP Multi Jet Fusion technology at [hp.com/go/3DPrint](https://hp.com/go/3DPrint)

Learn more about Chabloz Orthopédie at [chabloz-ortho.com/fr/](https://chabloz-ortho.com/fr/)

