Digital Earmould Production with **DETAX Premium Plastic Materials**

by **Dominic Schmidt**

The term "Industry 4.0" is the talk of the town and is being intensively discussed and implemented in all commercial sectors. An important part of this concept is manufacture of products using digital manufacturing methods, which are being used by an increasing number of businesses. In the audiological area, 3D production is likewise gaining traction (Fig.1), so that the process of earmould production is nowadays performed almost exclusively digitally. After successful impression taking by the hearing aid audiologist, using 3D impression scanners the ear impressions are digitally captured and sent to earmould laboratories or hearing aid manufacturers for preparation of hearing aid earmoulds / in-ear hearing aids. A manufacturing workflow in the earmould laboratories geared to this is accordingly necessary; the earmoulds are modelled individually and precisely with the aid of CAD programs. For manufacture, advanced 3D printers are used; the most widely used method here is the DLP method (Digital Light Processing). Requirements arising from this are new materials that are optimally matched to these manufacturing processes. DETAX provides such premium materials for digital manufacturing of hard & soft earmoulds (using the cast method). In the following report, the materials DETAX luxaprint® 3D shell/mould, as well as the associated varnishes DETAX luxaprint® shellac are contemplated more closely.

In our earmould manufacture, we rely exclusively on 3D printers by the vendor rapidshape, which are optimised for continuous use in the earmould laboratory. Combination of the rapidshape HA90 system with the premium plastic materials DETAX luxaprint® 3D shell/mould permits manufacture of about 40 – 45 earmoulds within approximately 80 – 90 minutes (400 layers). This means an enormous time advantage over traditional manual

Fig. 1: Professional in-ear monitoring with shells made of luxaprint® 3D shell

Fig. 2: Multilayer print on the HA 90

production. Apart from that, there is also the possibility of operating the equipment overnight in a multi-layer operation (Fig. 2), thus optimally using even the non-working time. Another advantage of using the DETAX premium plastics is the possibility of directly producing coloured eartips (Figs. 3 + 4). Thus, thin shells (DETAX luxaprint® 3D shell) for in-ear hearing aids or in-ear monitoring can be printed in colour. This represents a significant improvement over precision earpieces subsequently painted in the desired colour. The colouring is evenly and uniform, the risk of varnish runs and thus inhomogeneous colour intensities is not given.

This is an important advantage in the production of (hard) hearing protection earmoulds, which are normally manufactured in red / blue colour for simple, uniform side marking. High-priced premium products, such as in-ear monitoring devices, get a significantly improved surface finish from use of DETAX premium plastics, compared to manual production or subsequent application of lacquers. After final assembly, even products consisting of several parts look as if made from one piece and of accordingly high quality. Thanks to the availability of a wide variety of colours (clear-transparent, pink-transparent, pink-range, light beige, red, blue, yellow-fluorescent, intense red, intense blue, black, white and beige / Fig. 5), customer needs can be met optimally and the highest quality. The digital production of rigid in-ear shells also makes it possible to manufacture considerably smaller earmoulds and hearing aids; the components can be optimally arranged already on the screen. Moreover, any filter systems or multichannel bores can be implemented directly, offering completely new possibilities in the production of such systems and outstanding improvements and advantages over traditional manual production.

Printing in a variety of colours can be achieved by simply exchanging the material storage bin of the printer within just a few minutes.

In comparison with conventional materials, use of DETAX premium plastics results in significantly lower consumption of material and easier cleaning of the machine, since the material has considerably lower viscosity.

After removal of the support structures, using DETAX luxaprint® shellac a final finish can be applied to the earmoulds. The perfect matching of the varnish with the earmould material ensures fast and easy processing.

Fig. 3: Application example:
Coloured plastic luxaprint® 3D mould

Fig. 4: Production of individual hearing protectors on the HA 90

Fig. 5: Colour variety of the luxaprint® 3D Premium plastic materials

Fig. 6: Permanent colour sealing with luxaprint® shellac color

The classy surface finish thus obtained enhances the durability of the earpiece and ensures increased quality perception by the wearer or audiologist. The surface produced by the coating is scratch-resistant and easy to clean and ensures reduced adhesion of earwax; additionally, the varnished earmoulds yellow significantly less. As a further advantage, the availability of lacquers (DETA luxaprint® shellac colour / Fig. 6) is to be mentioned, whereby colourless earmoulds can be easily and homogeneously dyed. The colours can be mixed with each other and thus adapted to any individual customer requirement.

Conclusion

Production of earmoulds and in-ear shells with DETAX premium plastics takes earmould production to the present state of the art and provides major benefits for the earmould laboratory as well as for the wearer. Thus, ear moulds can be produced significantly faster and more cost-effectively, and thanks to digital manufacturing they can be reproduced at any time. New production technologies enable constant innovation and ensure steady progress in the development of earmoulds with concomitantly supreme quality.

Representative sample: Monitoring with the HA 90

About the author

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Bachelor of Science, has been active in the audiological development department at Hörluchs hearing protection systems in Hersbruck since early 2015.

Since his training as a hearing aid acoustician and studies in hearing acoustics (B. Sc.) at the University of Applied Sciences Lübeck, he has been working on innovative developments in audiology and hearing protection.

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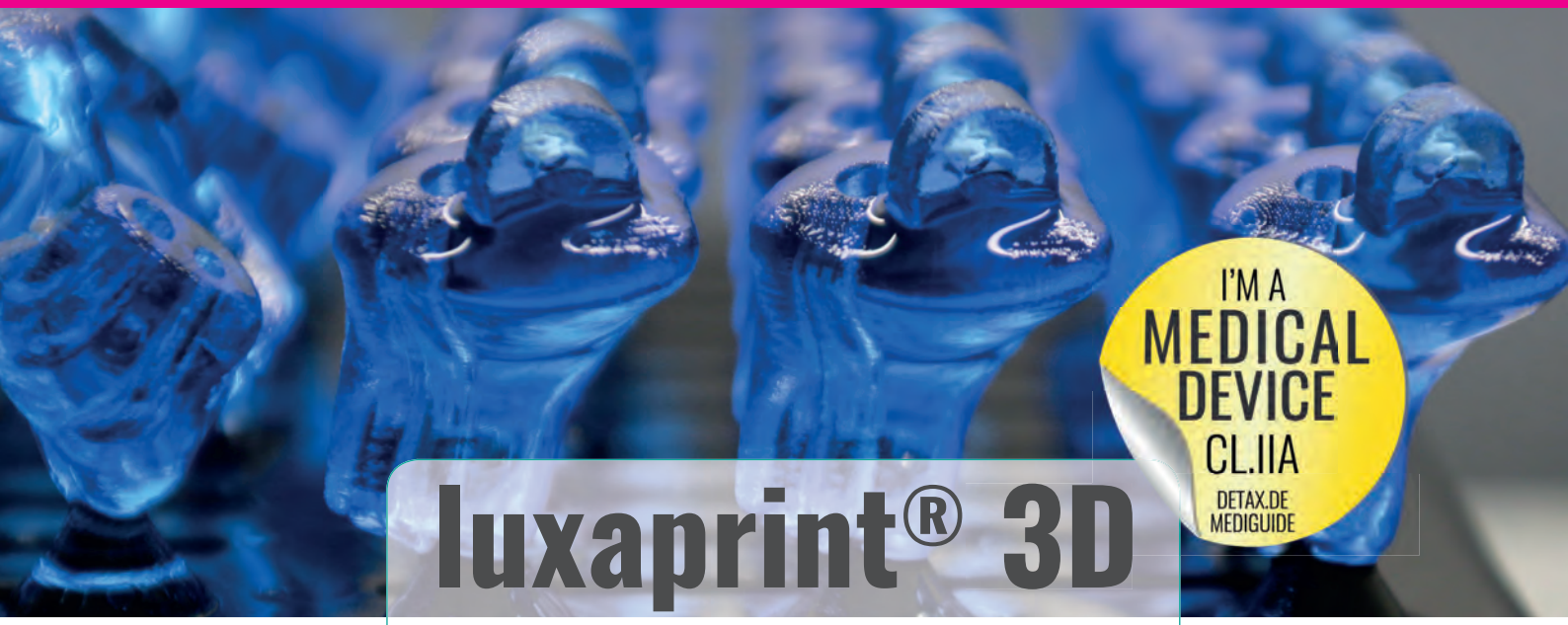

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UV Premium Resins

luxaprint® mould

- for hard earmoulds & hearing protection (BTE, monitoring, etc.)
- highest transparency
- best mechanical features
- biocompatible

luxaprint® shell

- for hard ITE shells
- maximum precision
- thinnest shell walls
- high fracture resistance
- intensive colours
- full cure
- biocompatible

luxaprint® cast 2.0

- for cast forms (fabrication of silicone earmoulds)
- reduced loss of material due to low viscosity
- fast cleaning
- easy to break
- effortless removal

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