Denture castings can also be precisely rendered using the same measurement technique and, among other things, enter as an important parameter into surgical planning: They can be used to simulate profile changes before jaw surgery. In this manner, the 3D-castings deliver crucial data concerning the changeable and unchangeable parts of the face.

3.3 Helmet treatment

The heads of infants can show deformations or asymmetries after the birth process. There are many factors that may influence the development of deformational plagiocephaly, such as premature births, restrictive intrauterine positioning, multiple births, and/or birth trauma. The majority of deformations can be treated with physiotherapy – however, a small proportion of deformations persists. To bring the heads to shape a lightweight plastic-helmet can be used [4].

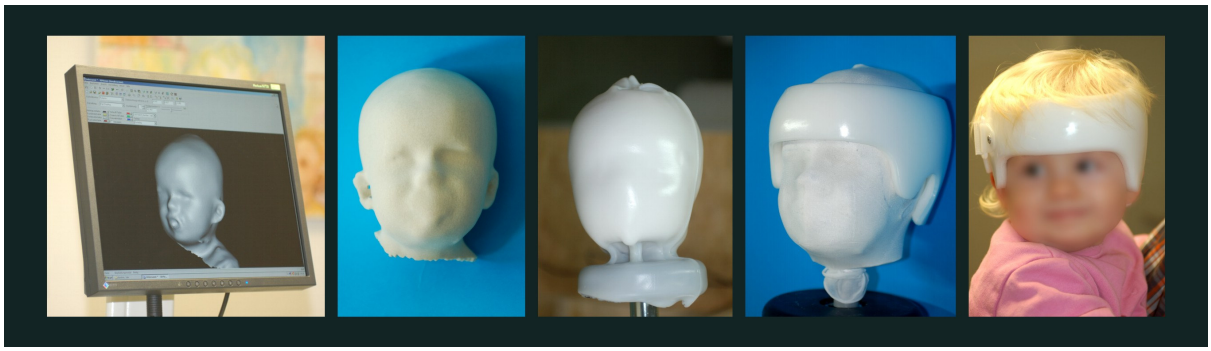

Fig. 3. Helmet treatment for an infant. From left to right: 3D-data captured from the infant using the FaceSCAN^{3D} sensor. From the 3D-data a 3D-model of the infants' head can be formed. The 3D-model is covered by the basic material of the later helmet. The helmet is obtained by cutting the plastic into the required shape. The lightweight customized helmet fits precisely onto the infant's head.

The helmet is a customized orthosis to treat head shape deformities. At correctly shaped areas the helmet touches the skull, whereas it leaves some space at the deformed areas. The helmet supports the optimal development of the infant's skull, resulting in a well shaped head. The best age for treatment is between 3 and 9 months, because in this time window the skull is growing at its fastest rate.

The FaceSCAN^{3D} sensor is used for the customization of the helmets by providing the accurate 3D-data of the deformed head (see Figure 3). With the aid of a sophisticated mirror unit and very fast cameras the heads of infants can be scanned all around in a half of a second.

4. Conclusion

With our fast optical sensor we obtain precise measurements of the soft tissue surface. Based on this 3D-data we provide the surgeon means for an objective analysis. In the near future, optically measured 3D-surface data will be combinable to CT-data and to cone-beam CT-data. New software tools will increase the number of applications in the medical field. Therefore, it is to be expected that the manifold opportunities of 3D-surface data will find their way to the clinical standard.

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