

PhD THESIS

„Engineering method for supporting the baby’s skull deformities correction”

AUTHOR: MSc. Eng. Edyta Kawlewska

SUPERVISOR: DSc. Eng. Marek Gzik, Assoc. Prof.

ABSTRACT

In this thesis the comprehensive procedure of engineering method for supporting the baby’s skull deformities correction was developed. The researches was conducted in collaboration with the neurosurgeon from Upper-Silesian Child Health Centre in Katowice.

At the beginning, the standard set of skull shape indices was determined. Craniometric data were processed with the use of statistical methods. Morphological analysis also included the skull thickness analysis .

In the next stage the osteotomy was planned in *Mimics* environment and the models were prepared for stress analysis in *ANSYS* environment. Four cases of correction were presented: classic and endoscopic trigonocephaly surgery, endoscopic scaphocephaly surgery and total skull vault remodeling.

Finally, on the basis of shape indicators, planned ostotomies and biomechanical analysis of variants the optimal methods of correction were chosen for each patients.

With the planning process the surgery can be more effective. In addition the duration of treatment is reduced by about 1 hour, which is particularly important in case of infants surgery (less anesthesia time, less risk of blood loss, increased patient safety).