

## **Towards virtualization and optimization of sinus surgery planning and execution**

**Zoran Kunica<sup>1</sup>, Gorazd Poje<sup>2</sup>, Denis Mlivić<sup>1</sup>, Jan Topolnjak<sup>1</sup>**

<sup>1</sup>University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture, <sup>2</sup>University Hospital Centre Zagreb; Department of Otolaryngology, Head and Neck Surgery, University of Zagreb

Correspondence address: Zoran Kunica, zoran.kunica@fsb.hr

**Introduction:** The development of technology offers great possibilities for better understanding, design, standardisation, execution and subsequent mechanisation and automatisisation of manual work in complex human activities which are yet to be observed, such as in endoscopic sinus surgery (ESS) where deformable, flexible and biological work objects are present in rather small production quantities.

**Aim:** Those possibilities are achievable only by performing the capturing and thorough analysis of the existing ESS manual work process, where movements are further complicated by the variety of instruments/tools used in the different phases of the surgeon's work.

**Methods:** On the basis of the chosen surgery process, the paper tries to establish an integrated approach that would include experiments for motion capturing and analysis using traditional and modern methods and equipment, such as an optical video camera, predetermined motion time systems, Leap Motion Controller, Perception Neuron 2.0 and Emotiv EPOC+. Moreover, the research intent is to encompass not only physical but also accompanied mental work in the process.

**Results:** The mentioned integrated approach would enable more quality planning and execution of the chosen surgery process and the results expected in the near future could prove valuable initially in the training of new generations of ESS surgeons.

**Conclusion:** The possibility to analyse and measure human body movements including mental energy is always of great importance for work but also for everyday life. Technology development, particularly in biometrics, results in new, more complex tools and higher levels of materialisation that cover and create more and more realities, that are offered for the involvement of human consciousness (eros). This allows the design and standardisation of manual work in human activities which are yet to be observed, especially those of low scale (small production volume, single-unit production), such as ESS surgery.

**Keywords:** endoscopic sinus surgery, technology, manual work process