

Summary: Master Thesis Marc Wenzel

Topic: *Conception, Development and Investigation on external Integration of a Breathing System into a new Anesthesia Device.*

Technology for life - Under this guiding principle the Dräger Medical GmbH is committed to the development of innovative, advanced medical devices. Especially in the field of anesthesia, devices from Dräger are present in medical facilities all around the world. Without the loss of quality *Made in Germany*, Dräger Medical strives to offer affordable devices for financially weaker customers as well. Therefore, devices with improved economy and cost optimized are constantly developed.

For the development of a new anesthesia device, concepts for a cost-optimized breathing system integration are developed and evaluated. One approach is to combine the latest breathing system of the Perseus A500 with the pneumatic components from Fabius. Hence, the electrically driven valves of the A500 breathing system shall be driven pneumatically. In this thesis the concepts for the external integration of the Perseus breathing system were developed and the performance investigated.

For the conception, the requirement and feature specification were determined. Based on the features and the defined problems, possible solutions were determined and three concepts developed. These concepts were designed with the 3D-CAD software *SolidWorks* and cost analysis was performed. An evaluation of the concepts in order to identify the best solution for further development, resulted in an integration with an interface, similar to the A500 system, attached to the side of the device. Based on the result, the final concept and the features were designed in detail. For prototyping, the design of all parts were verified, i.e. tolerance analysis, and the required documents created.

The detailed investigation on the pneumatically driven valves, resulted that the performance of this approach is comparable to Fabius or Primus. Furthermore, the important issue of resonant oscillations of the PEEP valve could be identified during measurements in the Research Unit of the Drägerwerk AG.

Finally, the results obtained during this thesis supported the decision that the external integration approach will not be further investigated. Due to the technical disadvantages of the pneumatically driven approach and the expectation of a higher cost advantage, lead to the decision for an alternative approach for the integration of the A500 breathing system.