



**solve** engineering  
a Variosystems company

**Solutions with added value.**  
**Competent in Electronics-**  
**and Firmware Development.**

### **Startup company with high potential**

Organis GmbH is a Swiss company founded as a start-up in 2011 by specialists in respiratory physiology and ventilation technology. It is the developer and manufacturer of TestChest®, a highly realistic lung simulator for teaching and training anaesthetists, intensive care physicians and nurses.

## **Organis GmbH, Switzerland**



# Training to save lives

**TestChest® is designed to simulate the lungs and respiratory organs for teaching and training purposes. The device can be used either as a stand-alone training station or integrated into a fully-fledged patient simulator. TestChest® transforms a laboratory dummy into a physiological lung simulator because TestChest® has an airway opening. Training on one of these practice dummies ensures that ventilators are used professionally in the case of an emergency.**

## From functional model to market maturity

The TestChest® project was initially sponsored by Innosuisse, the Swiss Agency for Innovation Promotion. The objective now was to further develop the electronics resulting from this project into a product suitable for industrial use.

The simulator is parameterised via a PC user interface. In selecting the development partner, Organig set great store by a high level of expertise and customised advice.

## Expertise in solutions for microcontroller systems

Solve GmbH possesses long-term project experience in the programming of real-time operating systems for microcontrollers as well as in the creation of schematics and layouts for industrial electronic control systems. This also includes the EMC tests required for CE conformity.

For the TestChest® project, additional experience was called for in the development of an Ethernet communication to a higher-order computer and a CAN interface communication to a linear motor.

## Phase 1: Functional optimisation

For the lung simulation, the microcontroller-based system digitally controls four valves for the air supply and air exhaust of the respiratory channels. Furthermore, the TestChest® includes a linear motor, which simulates a bellows-like effect for breathing, and a DC servo motor, which controls the channel for air supply.

The user defines the parameters (heart rate, resistance to airway etc) using the PC user interface. The sensors supply several measurement data on the monitor in real time. The first phase was about establishing stable functionality and optimising the existing control software.

## Phase 2: Electronics re-design

In the course of the project, the previously used processor was replaced. Solve was asked to optimise the electronics and equip them with a new processor. The ARM Cortex M4 microcontroller supplied by STMicroelectronics has proven to be the best solution. It is particularly suitable for such applications thanks to its high performance and good cost-benefit ratio. The firmware was developed from the ground up. The electronics were designed and manufactured in



## Fabian Schnellmann, Project manager

“It was a particularly exciting and challenging task to develop a device for industrial use from a CTI project. Especially since it is a very useful product which helps to save lives. As a project team, we are proud that Organig quickly established itself as a success on the market.”

collaboration with Variosystems. After all the testing, Organig took delivery of a reliable and cost-optimised product.

## Perfect product at an attractive price

The start-up company Organig benefited from Solve’s many years of experience in software and electronics development. Working within a minimal budget, Solve successfully created a market-ready product from a prototype.

The client particularly appreciated the consulting and flexibility in the optimisation and stabilisation of the existing firmware. As a start-up company, Organig was operating on a minimal budget. Solve’s many years of experience ensured that this was adhered to.