



Flexible, customized adjustments
and developments for ventilators
from

HAMILTON
MEDICAL

CONNECTION

SUCCESS STORIES



 **YAMAICHI**
ELECTRONICS



Flexibility and customized adjustments for ventilators from Hamilton Medical

The HAMILTON-C6 is now used in intensive care units worldwide to ventilate critically ill patients – for the new development, Hamilton Medical was looking for a robust connector.

HAMILTON MEDICAL

Hamilton Medical has been working on the development of intelligent ventilation solutions since 1983 and is today the leading manufacturer of ventilation solutions for intensive care, covering a wide range of patient target groups, applications and environments.

Hamilton Medical is a third-generation family business based in Bonaduz, Switzerland.

INITIAL SITUATION

- New development of HAMILTON-C6: Search for a robust and cost-optimised solution for the connection of two device components
- Providing a hybrid connection (power and data connection for Ethernet)
- Pluggable solution from the outside of the device on both sides for the use of different cable lengths
- Resistant to common cleaning substances used in clinical environments as well as an extended IP class
- Matched internal cabling via Rigid-Flex Board

SOLUTIONS AND IMPROVEMENTS

- Customized push-pull circular connector system
- Creation of a PCB and testing of components – all from one source
- Possibility for end customers to use the ventilator flexibly according to their individual needs
- Very robust solution – designed for daily use

Challenges and requirements in the medical environment

In 2015, for the new development of the HAMILTONC6, Hamilton Medical was looking for a robust and cost-optimized solution for connecting two components – or more precisely, for connecting the ventilation unit with the interaction panel (power consumption approx. 55 W) and the data connection (Ethernet with 100 MBit/s). To guarantee the customer a choice of different cable lengths of up to 10 metres, the solution had to be pluggable on both sides of the unit. The challenge inside of the unit was to develop a connection between the sockets, which had to be mechanically fixed to the housing, and the PCB that could transmit the high currents of the power supply and also have good signal transmission properties for the Ethernet signal. In addition, all external components should be resistant to the cleaning substances commonly used in the clinical environment and all connectors should be leak-proof between the contact area and the internal connection area when unplugged.

internal connections (device socket to PCB) for power supply and high-speed data. Yamaichi also took responsibility for maintaining the specifications of the complete interconnect solution from the PCB in the Ventilation Unit to the PCB in the Interaction Panel. Yamaichi defined the required tests, created the necessary test adapters and tested the connection – both for signal integrity of the Ethernet connection and for power drop and heating at full load during operation.

“The fact that the offer from Yamaichi had the best price/performance ratio should also be mentioned here“.

Marc Maeder, Hamilton Medical

Enormous flexibility in the configuration of Y-Circ P connector components

Hamilton Medical had requested a standard connector from Yamaichi Electronics - but due to the requirements, they were immediately recommended a customised solution, which then convinced them. In addition to a hybrid pin layout, a rear sealing in the connection area and overmoulded bend protection on the cable, Yamaichi created a customized housing for the device socket. In addition, there was the competence to develop and supply a customized Rigid-Flex Board for the

High flexibility with customized design:

- Hybrid pin layout
- Back moulding in the connection area (IP protection)
- Overmoulded bend protection on the cable
- Housing of the device sockets
- Rigid-Flex Board
- Compliance with the specifications of the complete connection solution from the PCB in the Ventilation Unit to the PCB in the Interaction Panel



Clear and constructive exchange

The entire process was characterised by clear and efficient communication. There were only two physical meetings during the whole time. However, the technical questions were always clarified in direct online meetings with the responsible experts. The only obstacles encountered during development were individual delays. However, Hamilton Medical was always informed and could fully rely on Yamaichi to solve the problems.

"In addition to the adaptation and optimisation of the pin layout, the housing geometries and the sealing requirements by our product designers, our in-house electronics laboratory in Munich was challenged with the simulation and qualification of the hybrid pin layout (signal requirements in combination with the power supply). For perfect transmission and safe wiring within the two device parts by means of Rigid-Flex Board, the support and design by our PCB designers followed. The cooperation with Hamilton Medical has always been very cooperative and constructive".

Stephan Streit

Business Development Manager Yamaichi Electronics

Conclusion

With the HAMILTON-C6 Hamilton Medical has been able to develop a new generation of ultra-modern ventilators.

The Yamaichi solution has helped to offer their customers more flexibility and safety at work. By bundling the different aspects of the project with one partner - connectors, cables, device boxes, PCBs, and testing of the components - Hamilton Medical has been able to keep the coordination effort to a minimum and thus save internal resources.

Currently, Yamaichi and Hamilton Medical are already exchanging ideas for the next project.

Application in practice

Thanks to this solution, Hamilton Medical's customers have been able to place the ventilation unit and the interaction panel independently of each other – according to their individual needs. The solution is robust and can withstand the stresses and strains in practice. There have been no complaints so far. The HAMILTON-C6 and thus the connection solution from Yamaichi is used today in intensive care units around the world to ventilate critically ill patients.

