motherson

Development of an Integrated Digital Medical Gas Valve with Projected Display and Wirele Monitoring

The Client

A global leader in medical device manufacturing specializing in advanced healthcare gas delivery solution Motherson Technology Services was engaged by a leading medical device manufacturer to design and develop an integrated digital medical gas valve with a projected display. The goal was to enable precise flow and pressure regulation of medical gases, ensure real-time monitoring through a large projected display, and achieve compliance with stringent medical safety standards while maintaining user-friendly operation and long battery life.

Overview

This project aimed to revolutionize medical gas valve technology by designing and integrating a digital control system combined with a large projected display. The solution enables precise, real-time monitoring and regulation of medical gases such as oxygen, nitrous oxide, and anesthesia gases, critical for ensuring patient safety and care quality in hospitals and healthcare facilities.



Engagement Hardware and Firmware Development | Compliance Testing and Validation



Embedded Systems with BLE and Projected Display

Expertise

The project leveraged expertise in various areas, including:

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Embedded systems development using Nordic Semiconductor's nRF MDK SoCs

BLE communication and OTA firmware updates

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Integration of projection display technology for real-time parameter visualisation



Compliance with medical standards including ISO 13485, IEC 60601, and CE marking

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Battery-operated embedded programming with optimised lifespan management

The Solution

- Developed embedded C algorithms for dynamic gas . flow and pressure control using real-time sensor data
- Integrated BLE communication enabling wireless monitoring and OTA firmware updates
- Designed a high-visibility projected display for clear gas type, flow, and pressure information
- Ensured compliance with ISO 13485, IEC 60601, and CE medical device standards
- Implemented power-efficient hardware and software to extend battery life up to 2 years
- Delivered a turnkey digital medical gas valve solution enhancing safety, usability, and reliability

Benefits Delivered

The integrated digital medical gas valve solution delivered significant business value by enabling the client to introduce a cutting-edge, fully compliant product that meets stringent healthcare standards. The precision control and real-time projected display enhanced patient safety and operational efficiency, strengthening the client's reputation as a trusted innovator in medical technology. The device's extended battery life and OTA update capability reduced maintenance costs and downtime, improving total cost of ownership for healthcare providers. Overall, this turnkey solution opened new market opportunities in critical care and emergency medical services, driving revenue growth and competitive differentiation.