VICOR

Case study:
Sewer inspection robot



Low weight, low noise solution

Customer's challenge

Improved sensors, autonomy, mobility and AI (allowing deep learning) is enabling inspection robots to replace humans, especially in hazardous or confined areas like inside pipelines or in storage tanks. Manufacturers are looking for smaller, more robust solutions with ever improved resolution, repeatability and operating range. This manufacturer of tethered sewer inspection robots was looking to improve the sensor resolution and quality of video images without increasing the size of the platform. The key goals were:

- Allow easier handling and room for more sensors by reducing power supply size and weight
- Minimize interference with cable carrying video feed
- Reliable operation in a harsh environment

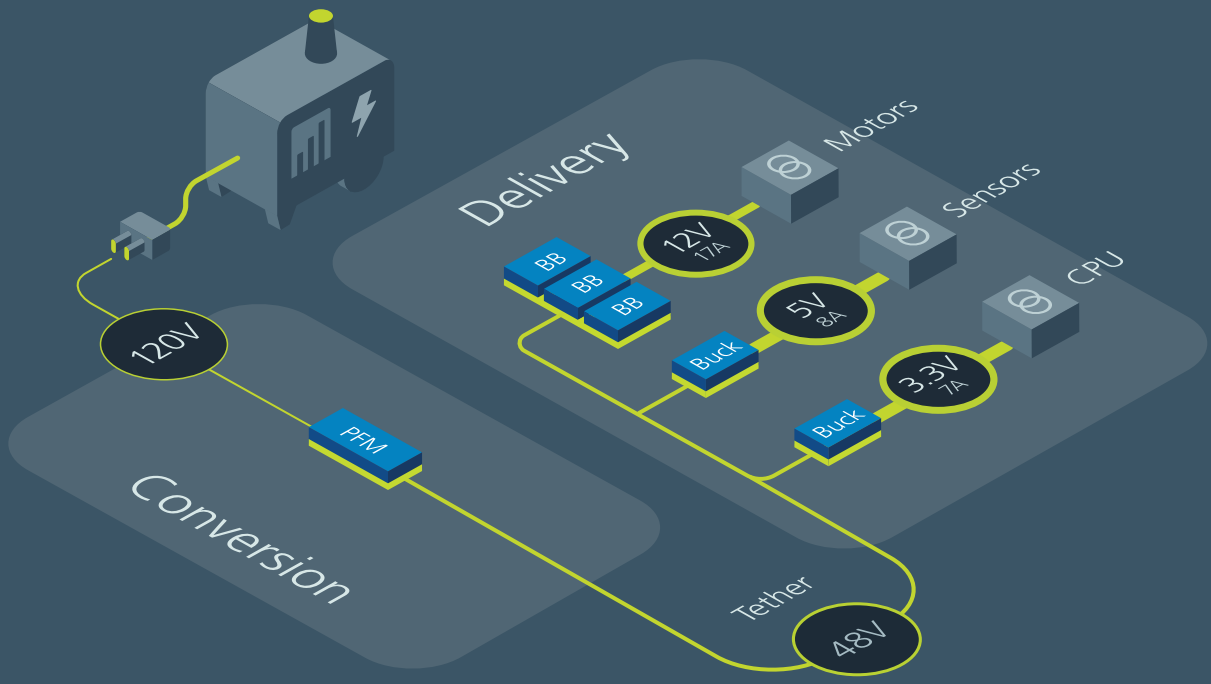
The Vicor solution

The 48V (SELV) supply to the tether was provided by a PFM AC-DC converter. On board the robot the three rails were provided by three individual regulators. Key benefits were:

- ZVS Buck and Buck-Boost regulators offered high power density and low weight (0.8g)
- Low noise ZVS topology minimized filtering required
- High efficiency (up to 92.5%) reduced heat, increasing reliability in high ambient temperatures

Vicor ZVS Buck and Buck-Boost regulators reduced the size of the solution

Power delivery network: The 48V tether supply was provided by a PFM AC-DC converter. At the robot the low power 5V and 3.3V rails were provided by ZVS Buck regulators. The higher power 12V motor supply rail was provided by an array of three ZVS Buck-Boost converters that compensated for large voltage drops in the 600m tether. To analyze this power chain go to the **Vicor Whiteboard** online tool.





PFM™ AC-DC converter

Isolated regulated

Input: 85 – 264V

Output: 24V or 48V

Power: Up to 400W

Peak efficiency: 92%

110.55 x 35.54 x 9.40mm

vicorpower.com/pfm



ZVS buck regulator

Non-isolated regulated

Input:12V (8 – 18V),
24V (8 – 42V), 48V (30 – 60V)

Output: 2.2 – 16V

Current: Up to 22A

Peak efficiency: 98%

As small as
10.0 x 10.0 x 2.56mm

vicorpower.com/buck



ZVS buck-boost regulator

Non-isolated regulated

Input: 8 – 60V

Output: 10 – 54V

Power: Up to 150W continuous

Peak efficiency: 97%

10 x 14 x 2.56mm

vicorpower.com/buck-boost

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