VICOR

Case study:
Medical knee surgery robot



Improving the ergonomics of hand-held tools

Customer's challenge

Reducing the scale of any intervention is a common aim in surgery, enabling the patient to recover more quickly. Miniature robotic tools can facilitate a reduction in the scope of the surgery. In addition, linking the position of the tool to a patient's CT scans improves precision and reduces risk. Reducing the surgeon's fatigue requires the minimization of the size of hand-held operating tools. This manufacturer had the twin goals of reducing the weight of their hand-held robotic tool and improving its reliability. The key goals were:

- Reduce size and weight of hand-held tool
- Minimize interference with other equipment by reducing noise generated
- Reliable solution required

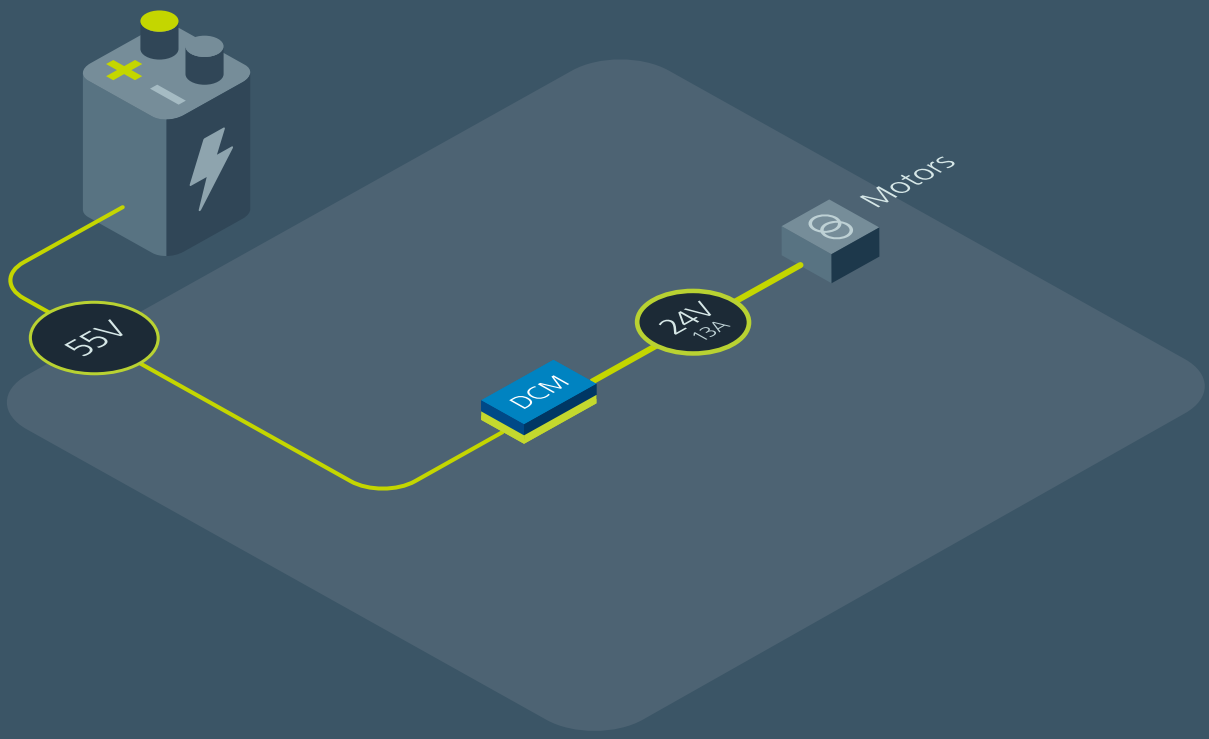
The Vicor solution

Power for the tool came from a 55V medically isolated bus and required conversion to 24V within the tool to drive the motors and control circuitry. To save space and weight a DCM DC-DC converter was selected that provided the 300W required in a footprint of just 8.8 cm^2 and a weight of only 24g. The converter featured a low noise switching topology and also provided isolation, helping to reduce EMI from the device. Key benefits were:

- DCM offered high power density (1kW/in^3) and low weight (24g)
- Low noise topology provided isolation and reduced filtering required
- DCM's high level of integration significantly increased reliability

Vicor DCM DC-DC Converter reduces size of solution

Power delivery network: A DCM DC-DC converter converted the 55V input to 24V 300W to drive the motor and control electronics. The high efficiency (91.3%) of the converter reduced waste heat in the tool, improving system reliability. To analyze this power chain go to the **Vicor Whiteboard** online tool.





DCM™ DC-DC converter

Isolated regulated

Input: 9 – 420V

Output: 3.3, 5, 12, 13.8, 15, 24, 28, 36, 48V

Power: Up to 1300W

Peak efficiency: 96%

As small as
24.8 x 22.8 x 7.21mm

vicorpower.com/dcm

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