VICOR

Case study:
Weaving loom

Power averaging saves cost

Customer's challenge

Weaving looms take spun cotton yarns and combine them into a woven fabric. Loom manufacturers are looking for ways of reducing the size and cost of their equipment while improving equipment flexibility, allowing end-users to make quick changes to the cloth's weight, pattern and style. The key challenges were:

- Integrating the stepper motor power supply into the motor drive assembly to reduce both system size and cost
- Scaling the solution so that new features could be added to the loom in the field
- Meeting AC input PFC standards

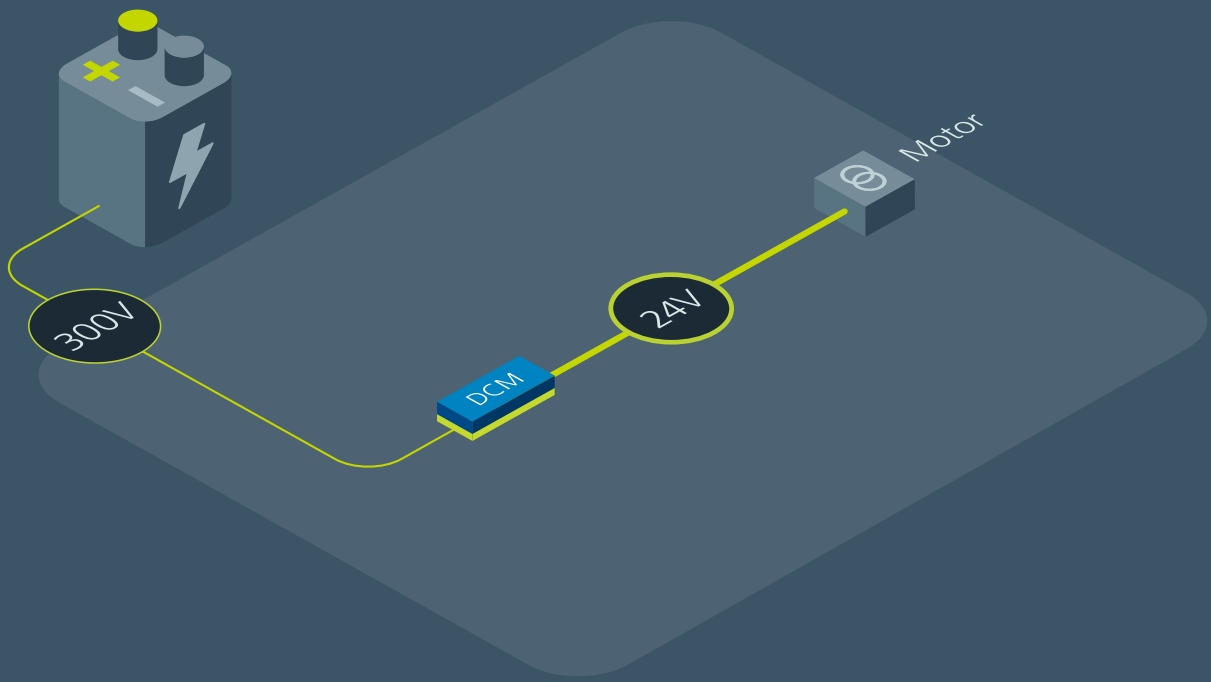
The Vicor solution

Typically hold-up and smoothing of the rectified 3-phase AC input is provided by a large bulk capacitor. By following the rectifier with a wide input range DCM DC-DC converter, this hold-up capacitor was completely eliminated, saving both bulk and cost. Stepper motors require the DC supply to source large pulses of current. A DCM can support large capacitive loads at its output and this capacitor reduced the peak current demands on the converter, and thus its size and cost. The capacitor provided power averaging of the high current pulses to the motor with the converter recharging the capacitor continuously between stepper motor load pulses. Key benefits were:

- Energy consumption and running costs were reduced by the supply's improved power factor and high efficiency (94%)
- Power averaging allowed a smaller (33cm^2), lower weight power supply that could easily be integrated into the motor assembly
- The DCMs are easily paralleled to provide higher power to meet the demands of larger motor drives

Wide input range DCM DC-DC converter eliminates hold-up capacitor

The Power Delivery Network: The power source to the loom was a 3-phase 115V AC supply, which was rectified to provide 300V DC. By following the rectifier with a wide input range DCM DC-DC converter, the hold-up capacitor was completely eliminated. To analyze this power chain, go to **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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