Advantages of motor current limiting

I want to comment on Gianni Pallotti's 4DoF Gamer's Seat project in your September issue (siliconchip.com.au/Article/11912). What an impressive project! It is pure mechatronics, and Gianni deserves applause for tackling such a project successfully.

I bet that at some point during the development of this project, he wished he had not started it. Projects that require electronic and mechanical knowledge and skill, plus programming, can develop into monsters. Although this project is not at the high end of complexity, it would still have been a serious challenge.

However, I noticed that the motor drivers are not current-limited. Permanent magnet motors draw heavy currents at startup and with a Bosch industrial version, the stall current was stated at 28A. I have used windscreen motors several times, and I vaguely remember early Holden motors peaking at something like 11-14A.

The problem is that the power supply must be big enough to supply this large current. If it does not have the current rating or considerable surge capability, it may fail or at least 'drop its bundle'.

I measured Bosch and Holden motors as drawing approximately 2A at no load and approximately 4A under normal load. If a current limiter (constant current circuit) set at 6A is used to supply Q2 and Q4 in each H-Bridge module, a much smaller and cheaper power supply can be used.

Permanent magnet motors do not deliver substantially more torque with a high stall current. The maximum current can be limited to a much lower value with little reduction in peak torque.

The most efficient motors will have low armature and brush resistances and therefore will have high stall currents, regardless of their power rating. The proper solution is to fit current limiting.

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Response: we believe that Gianni's specified power supply is more than capable of dealing with the peak power requirements of his design. Regardless, your comments are interesting and may be useful to constructors or those driving motors for other purposes.