

Case General Magnetic  
Reliable control for MagnoDrive Permanent Magnet PCP  
Top Drive Motor





The ACS880 variable frequency drive solved the MagnoDrive performance problems at low rpms.



With a MagnoDrive and the appropriate VFD, the full torque envelope is available throughout the entire speed range.

Customer benefits	
<b>Direct torque control for motor</b>	Provides the full torque envelop throughout the entire speed range without encoders
<b>Accurate and reliable motor control down to zero speed</b>	Allows the motor to run smoothly at low rpms
<b>Control program for artificial lifting applications</b>	Allows oil field operators to more easily manage their pump portfolio
<b>Excellent control of permanent magnet motors</b>	Helps provide considerable energy savings in oil production

**General Magnetic (GM) of Calgary, Alberta, Canada has developed a large 85-horsepower MagnoDrive Permanent Magnet PCP Top Drive Motor that drives progressive cavity pumps (PCP).**

Though a permanent magnet motor is initially more expensive than a comparable induction motor, it utilizes significantly less energy, allowing the initial cost differential to be offset early in its life cycle.

In considering the positive benefits of the MagnoDrive, Al Duerr, GM founder and CEO, and Mayor of Calgary from 1989 to 2001 asks, “In the oil industry the challenge is how do you transform what tends to be financially-driven, shorter term thinking into a long term value proposition? What could operating costs be if we had an overall 10% reduction in electrical energy? How would that drive to the bottom line?”

**Full torque over the entire speed range**

The main operational benefit of the MagnoDrive Permanent Magnet Top Drive over the conventional PCP drive is that the speed and torque envelop is available throughout the entire speed range; able to run full torque at 30 rpm, at 450 rpm, and anywhere in between, with approximately equal efficiency.

The vast majority of conventional PCP drives use AC induction motors. They have very good efficiency from 70% to 110% of their rated speed, but outside those speed ranges there are significant challenges. Permanent magnet motors are able to produce higher torque than the same size induction motors, providing greater operating efficiency.

The operating component of a MagnoDrive that enables the motor to run at any speed and torque within its operating envelope is a variable frequency drive (VFD) (also known as a variable speed drive (VSD)). A VFD is typically programmed to manage all possible situations, providing the advanced supervisory control that determines when to stop and start the motor, how fast it should go under varying loads, and how to most efficiently operate within any torque limits.

**Finding the right variable frequency drive**

Not all VFDs are created equally and some applications are more demanding than others. It is critically important to find the best brand and model for a specific application.

In the development stages of their MagnoDrive, General Magnetic noticed a problem when conducting field tests with an initial VFD it had selected.



MagnoDrives utilize significantly less energy than conventional motors, providing 10% savings on the single largest operating expense for oil field owners.



Aaron Brassard, GM vice president of engineering and development: “While we are officially drive agnostic and want to enable customers to use any manufacturer’s VFD they might prefer, I really like the ABB ACS880. If I had one choice, that would be the drive that I would use. It’s a fabulous VFD.”

“We were using a leading manufacturer’s drive, and we were having some tuning issues. Our field test crew noticed that the MagnoDrive didn’t run very well between 70 and 150 rpm. It would start to get some strange vibrations, become unstable and the VFD would lose control,” said Aaron Brassard, GM vice president of engineering and development.

“We especially had problems at low rpms, which are where PCP operators typically want to run, between 100 and 150 rpm. So if the system doesn’t run really well at that speed, it is a pretty big problem.”

### The ABB variable frequency drive

In search of a VFD more compatible with the MagnoDrive and the PCP application, GM contacted ABB.

ABB visited GM, did some research, and in early 2014 offered to provide a test ACS880 to see if the new VFD could provide the required performance upgrades.

“During our testing we had it running at all speeds and torques the afternoon that it arrived. It required a very tiny little tweak, and, in essence, it was basically perfect from day one.” said Brassard.

“So this is when we moved to the ACS880. The low rpm issue was not a problem with the ABB drive. We have put out somewhere between 8 and 12 systems since working with ABB and we haven’t had a single field call.”

### A very bright future

Speaking of the future prospects for General Magnetic’s PM Top Drive, Duerr concludes, “We have had growing interest within the industry because the operators and field engineers have found that our permanent magnet motors with the ABB VFDs allow them to manage complex wells in a way that they couldn’t before.”



Al Duerr, GM founder and CEO

“There is a need for the energy industry to up its game, and I’m excited that General Magnetic can make a significant, long term bottom line impact while also lessening the environmental footprint. When you consider electrical energy consumption, that’s the biggest single operating cost for energy companies trying to get oil out of the ground.”

# Contact us

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your local ABB representative or visit:

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