Eaton filters help ProAll Reimer Mixers deliver concrete across the world

“All of the Eaton filters arrive clean, we don’t find any shavings, and they don’t leak,” said Curtis Steele. “We just paint the filters and install them. It’s all pretty seamless.”

- Curtis Steele, ProAll Product Development Manager

**Location:**
Alberta, Canada

**Challenge:**
A sophisticated hydraulic control system on the customer’s volumetric concrete mixer required equally sophisticated filtration to protect the precision valves.

**Solution:**
Eaton HP171-0011 high-pressure filters were installed to keep the hydraulic fluid clean. Eaton’s global support network adds positive value for end-users.

**Results:**
ProAll has standardized Eaton HP171-0011 filters for all current production mixers and all planned future product additions.

**Background**
ProAll Reimer Mixers operate on an entirely different principle than the typical concrete truck one might see on the road. Instead of mixing the cement, aggregate and water while driving, a Reimer Mixer delivers the constituents to the job site in separate bins and mixes them on-the-spot for a fresh mix anytime, anywhere. The technology offers several advantages including the ability to deliver concrete over long distances to remote job sites and the ability to control the composition of the concrete precisely as it’s delivered including the addition of various other materials for special purposes, such as fiber, color, and many other chemical admixtures.

Adding colorants is self-explanatory, but many other materials are routinely added to concrete to achieve specific characteristics. Adding glass, steel, synthetic and natural fibers, for example, can reduce the permeability of the concrete to reduce water bleeding; help control cracking during drying; and, improve pumpability, impact, abrasion, freeze-thaw and shatter resistance. The fiber component of the fiber/concrete composite must be carefully controlled to achieve the desired properties with fiber typically being 0.1 to 3.0 percent of the total volume.

Chemical admixtures fall into six basic classifications:

- **Air-entraining**, which introduces microscopic air bubbles into the concrete to improve freeze-thaw resistance.
- **Water reducing**, which can reduce the amount of water required, producing a stronger concrete without the need to add additional cement and provide more consistent setting times.
- **Retarding**, which slows the setting rate of concrete to counteract the accelerating effects of hot weather that complicates finishing operations.
- **Accelerating**, which counteracts the effects of cold weather by increasing the rate of early strength development and reducing curing time.
- **Plasticizers** also known as superplasticizers, which increase the fluidity of concrete. Their
effect normally lasts for an hour or less, which means they are typically added at the job site.

- Specialty, which includes a wide range of admixtures for specific purposes. The most common specialty admixture is a corrosion-inhibiting chemical added to retard corrosion of steel reinforcements.

The proportions of each admixture must be carefully controlled to achieve the desired properties in the concrete. ProAll Reimer Mixers are ideal for these applications because they offer precision control and keep all of the components separate until they are combined on the job site.

Coordinating the motions of the various augers, belts and valves required to achieve the exact mix specified for each batch of concrete requires a sophisticated hydraulic control system with capabilities far beyond the simple directional valve and motor arrangement used on a drum-type mixer. ProAll’s newest model, the Commander™, uses a multi-valve manifold to control the belt that delivers materials to the mixing auger in exact quantities according to a program entered into the system’s computer control via a touchscreen.

The hydraulic system consists of a pair of load sensing piston pumps, one supplying 30 gpm for the mix-auger and the other supplying 20 gpm to the belt circuit. A gear-type charge pump is also included in the semi-closed-loop system. Maximum operating pressure is 3,600 psi with the mixing auger typically operating at 2,500 to 3000 psi and the belt circuit at 1,500 psi. Control is provided by two banks of proportional valves mounted on low-profile manifolds.

**Challenges**

The precision valves needed to achieve the level of control required in ProAll’s most advanced equipment require effective fluid filtration to meet the company’s field reliability goals.

“With the sophistication of the automated controls on our new mixer and the use of much more sensitive electro-hydraulic proportional valves it is extremely critical that fluid cleanliness levels be maintained,” said ProAll engineer Curtis Steele. “If fluid cleanliness levels are not maintained and valve sticking or failure should occur the equipment can become inoperable or behave erratically, which in the case of producing quality concrete is not acceptable. The control system does monitor and check issues with outputs, but when on the job site the requirement for trouble shooting or maintenance can become very costly.”

The first batch of prototype Commander units included a pressure filter at the inlet of each valve manifold. These filters were chosen primarily on the basis of initial cost, and offered a Beta value of 75.

“At first we were just trying to protect the valves from the crud that’s present in a system when it’s first installed,” Steele said. “Diagnosing a valve that’s failed because it’s jammed with metal shavings is costly and time-consuming.”

“But as the system got more and more sophisticated it became obvious that we needed really effective filtration and the economy filters just weren’t up to the task. The last straw was receiving a filter with a hole drilled through the threads which naturally leaked as soon as it was installed.”

“So, after about 4 months of less-than-optimal performance, we contacted our local Eaton supplier, HyPower of Fort McMurray, Alberta. We were already using Eaton CharLynn® motors for the mixing augers and belt drives, so they were familiar with the system and our needs.”

**Solution**

HyPower recommended a pair of Eaton HP171-0011 pressure filters for the ProAll application. These are high-pressure, cartridge-type filters equipped with 7-micron, Beta 1000 elements. HP series filters are rated to pressures up to 6,000 psi and maximum flow rates of 180 gpm.

ProAll selected the Eaton filters over a lower priced competitive product in large part because of Eaton’s global network of service and distribution. This was an important consideration because ProAll Reimer Mixers are used in more than 40 countries around the world.

Eaton’s engineering support was also a key factor in the decision.

“When we were at the final selection stage of choosing a new filtration solution, I was there talking to Curtis Steele, the ProAll Product Development Manager,” said Eaton Product Sales Manager, Chris French. “He was on the fence as to what he should do and asked me how the filter will work under a variety of situations such as temperature, oil conditions, etc. So, I pulled out my cellphone and showed him the Eaton PowerSource® calculator and was able to send him the graphs as we sat in his lunchroom.”

Eaton’s HP pressure filters handle very high flow rates with a single housing. Inline and flange mounting with various port connections available.

**Results**

ProAll has standardized the Eaton HP171-0011 pressure filters for the 100 or more Reimer mixers they build each year. The only modification required was a change in the hole spacing on the mounting bracket.

ProAll also replaced the basic fill-cap style 40µm breathers on the Commander hydraulic reservoirs with Eaton MBR110 Mobilegate™ air breathers.

“We switched to the MBR110 for the same reasons as the pressure filter, which are much better particulate filtration for the air breather. The moisture expelling feature is also a nice bonus for our wet/humid customer locations.”

“All of the Eaton filters arrive clean, we don’t find any shavings, and they don’t leak,” said Curtis Steele. “We just paint the filters and install them. It’s all pretty seamless.”

Eaton’s HP pressure filters handle very high flow rates with a single housing. Inline and flange mounting with various port connections available.