

Faster response times on snowy slopes

Prinoth sought a solution that could tackle extreme, snow-covered slopes and provide skiers with pristine conditions. The company uses an Eaton valve to give its snow groomers faster response times for its operators.

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The snow groomer Leitwolf is the strongest vehicle of its class: the six-cylinder diesel engine has an output of 390 kW and generates torque of 2460 Nm (Photo: Prinoth)

Whether snowboarding, downhill, or cross country skiing, resorts around the world count on well groomed slopes to keep the conditions safe and their customers happy. With its snow groomers, Prinoth delivers performance with innovative technology, efficiency, and a strong design. The crews piloting the vehicles work in extreme conditions: snow, ice, steep slopes, and all of that at night.

That's why the Italian company relies on a resource-efficient use of snow groomers and provides ski resorts with the knowledge necessary to improve performance and reduce operating costs. Along with the equipment, the company provides specialized training for snow groomer drivers.

Snow grooming is more than "mowing" snow on a mountain. Blade positions are constantly moving to collect the right amount of snow given the moisture level, temperature, and other variables. Operators depend on feedback to know their blade settings, which is a delicate art and science. They require fast reaction times and the ability to sense the blade position when starting or stopping a movement.

The company found that the hydraulics needed a higher level of control, with a typical response time of 1,1 s - too slow for snow grooming machines. With traditional systems, the hydraulic options to achieve good flow control resulted in an overuse of orifice restrictors, which generate noise in some conditions. Eaton was challenged to provide components to help the company make more dynamic machines.

Dynamic machine control means a quieter, quicker, and more efficient operation. Eaton provided [CMA valve](#) digitally tuned with the Pro-FX Technology platform to help improve response times on the machines. The CMA valve is a mobile valve with independent metering, which offers many possibilities to differentiate machine capabilities. The CAN-enabled electrohydraulic mobile valve also features on-board electronics and software algorithms.

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The Leitwolf is the world's first production vehicle in its class to meet the "Stage IV/Tier 4 final" exhaust emission standard (Photo: Prinoth)

The valve helped produce changes in response times: where older systems had a typical response time of 1,1 s, systems making use of the CMA valve produce response times of 0,15 s. For the operator, adjusting the blades on a snow groomer, this appears as a nearly instant response, which allows for precise control on the slopes no matter the conditions.

Because the valve functions as an embedded system, it communicates via CAN and does not require dedicated wiring. An embedded system simplifies both the manufacturing and the subsequent servicing. With the Leitwolf snow groomer in particular, Prinoth used the valve technology to make leaps in improving serviceability.

"Eaton's CMA valve helped Prinoth to simplify and customize the hydraulic system. Prinoth is able now to provide a more effective service to the final customer, thanks to the embedded diagnostic system of the valves" said Alberto Paoletti, system development engineer. "Service engineers use a diagnosis program to monitor valve status and issues are reported to the snow groomer driver to further identify and resolve potential problems."

With its competence in manufacturing tracked vehicles, the Italian company also develops tracked utility vehicles for off-road use in remote areas as well as tracked carriers with mulching attachments for the sustainable management of vegetation areas.

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