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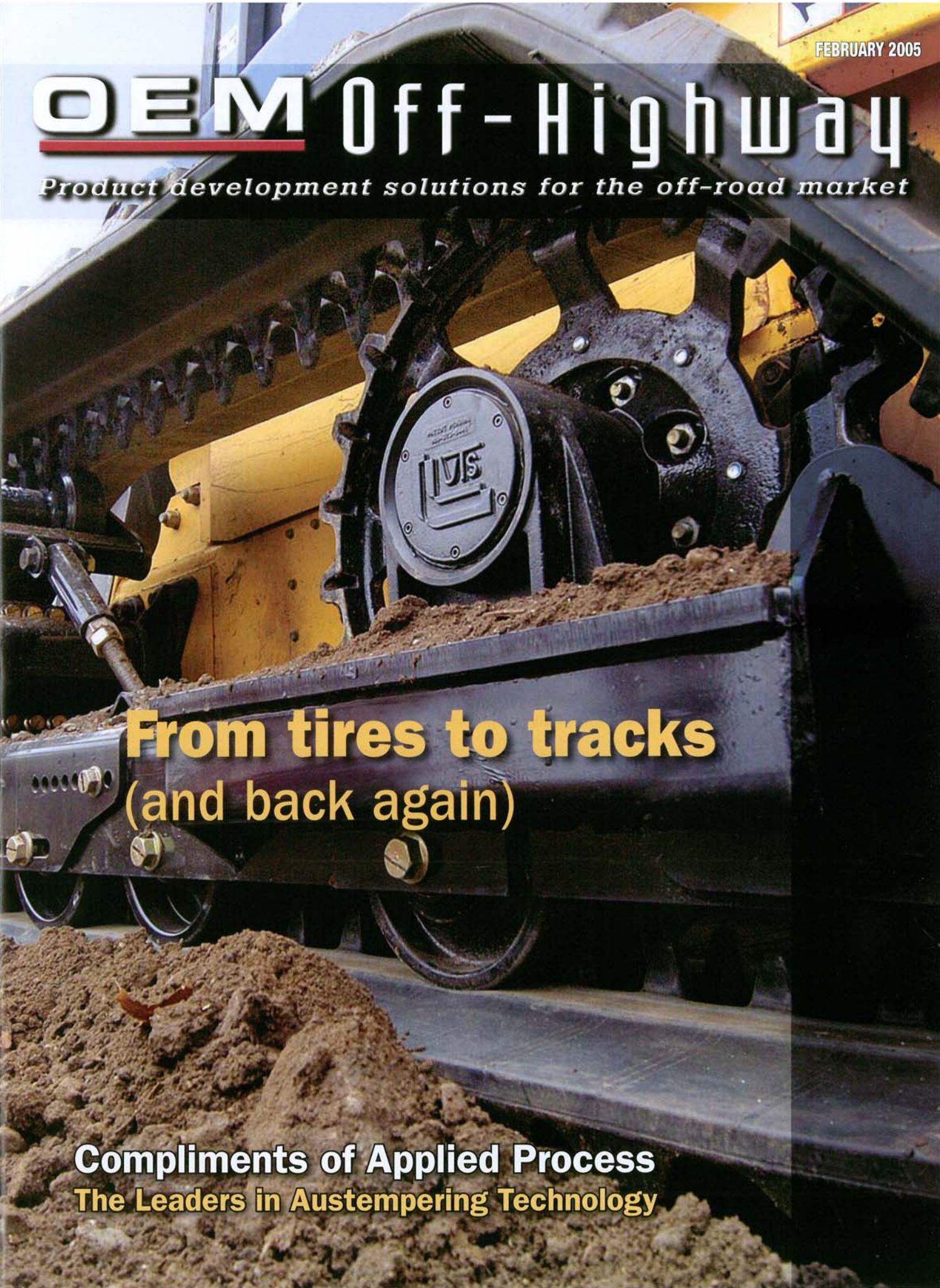
OEM Off-Highway

Product development solutions for the off-road market



From tires to tracks (and back again)

Design

From tires to tracks (and back again)

For a company that has produced over-the-tire tracks for skid steers for over three decades, engineers at Loegering Mfg., Casselton, ND, were well-suited to develop a fully tensioned track designed to replace the wheels all together.

Like many innovations, the idea, for what was eventually called the Versatile Track System (VTS) actually originated when engineers were attempting to address a different challenge.

"We were trying to come up with a concept to put some kind of slip clutch on the front axle so you didn't have to disconnect the chains in order to install over-the-tire rubber tracks," says Ron Hansen, project engineer for Loegering. After considering several ideas, George Loegering, then owner of the firm (Loegering was acquired by ASV Inc, Grand Rapids, MN, in October 2004), came up with a bearing concept which bolted to the hub, says Hansen. That is the concept that today's VTS unit is based on.

While the idea of developing a track system like this had been floating around on the drawing board for years at Loegering, it wasn't until the recent explosion in popularity of tracked skid steer loaders that this idea became a viable business option.

The concept was straightforward: Develop an independent suspension undercarriage that could be installed on skid steers by removing the wheels and bolting the unit on to the same hubs. The goal was to avoid having to bolt the system directly to the frame or modify the frame in any other way. This way contractors and rental yards could switch the wheels for the tracks and vice versa depending on what the application or the customer called for. Loegering conservatively estimates that this change can be done in an hour or less.

To maximize manufacturing efficiencies, engineers also wanted to create a single undercarriage that could be easily adjusted to fit all makes and models of wheeled skid steers. Engineers accomplished this through the use of an adjustable length "tunnel" that can be set to fit skid steers with wheel bases from 42.5 in. to 53 in. The unit works the same on long and short axle machines.

The Loegering VTS track system can be installed on a number of different skid steers.

Design drivers

Beyond the versatility aspect of the undercarriage, engineers developed this track system with stability and operator comfort in mind, the major reason for the unit's independent suspension. The moveable, independent suspension allows the track to stay in contact with the ground, especially on uneven terrain. "If you are pushing into a pile, the front of your machine will naturally want to come up, leaving only the back part of the track on the ground. With the VTS' independent suspension the track can go up and down about two inches. So as you are pushing into a pile the full length of the track can meet the ground, compared to just six or eight inches on the back," says Hansen.

And the ride is smoother. "Because of the front independent suspension, you can go wide open over rough terrain and without jarring the operator or creating excess vibration and shock to the loader, inherent to most track machines," he adds.

Increased stability is another benefit of the VTS. The idlers can be adjusted to extend as far as possible in the front and back of the machine. This helps with stability while loading as well as going up slopes.

Because the VTS is used on machines that weren't initially designed to be propelled by tracks, designers focused on creating a system that would not damage the host machine. Loegering engineers designed the sprocket so that speeds were decreased by 18% (about 1 mph) versus a wheeled machine.

This decrease in speed allows more torque to the ground. And inflicts less stress on the axles and drive system of the host machine.

Challenges

Development of the VTS was not without its challenges. One of the hurdles that Loegering designers had to overcome was the fact that axles on host machines were often out of concentricity.

"If you watched the hub, it would wobble a little bit. It wasn't a lot — 40 or 50 thousandths — but if you are putting on a fixed metal structure, it will gradually fatigue that metal," says Hansen.

The solution was a durable, injectable rubber product. "We ended up designing the hub to have a 1/8 in. layer of this rubber in the hub. It provides stiffness, so the machine doesn't look like it's bowlegged from the back, but allows the axles to move enough when they are out of concentricity so that it doesn't fatigue our frame," says Hansen.

The other challenge developers ran into was finding durable metals, especially for the spindles that mounted to the hub that the bearing would be mounted to. The answer was a lightweight but tough austempered ductile iron. It was eventually used for the hubs, spindles and rolling components.

Development and test

Development time for the VTS was fast — about 14 months. Hansen credits part of the reason they were able to develop the product so quickly is because they had a clear idea of what was needed in this type of track system. "George (Loegering) and I have nearly 70 years combined experience in engineering, manufacturing and skid steer operation. We knew what customers would want from a product like this," says Hansen. But all of those involved in the development knew that the test phase of this process would be the most important. The VTS was tested on four machines that ran 24/7 for 500 hours in extremely severe conditions — frozen dirt, water and mud. Loegering also invested in structural analysis and FEA on the design.

"We wanted this to go out and be a hit." So far, says Hansen, with hundreds of units in the field, there have been virtually no issues.

Hansen was quick to add that the successful introduction of the VTS with such a short development time did not happen without the concerted effort of the entire development team. "From the outside consultant we hired that championed this project internally to the test technicians that kept this product running through -30 F weather, it was truly a team effort," says Hansen.

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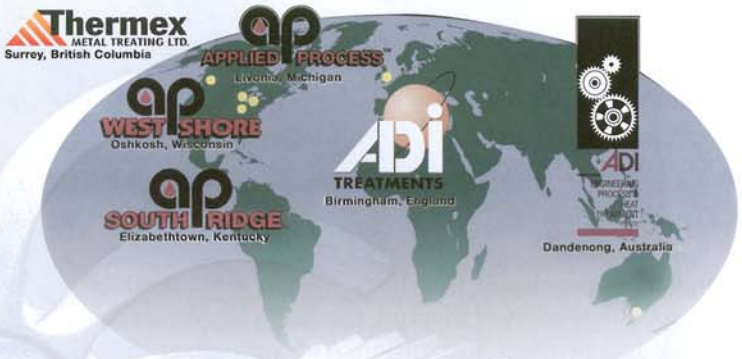

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