

PRESS RELEASE

Safim braking systems get smart thanks to mechatronics

At Agritechnica 2019, Safim presents its advanced projects in the world of mechatronics that allow braking systems for agricultural machines to become intelligent. Already at an advanced stage of development, these projects use solutions for controlling vehicle dynamics, including Brake-by-Wire technology.

Modena, October 2019 - Safim S.p.A., a leader in the production of components for highly engineered hydraulic braking systems used on off-highway machines and trailers, presents a series of new technologies that combine mechanics and hydraulics with electronics. One of these, the Smart Braking system, is already at an advanced stage of development in the world of mechatronics, allowing braking systems for agricultural machines to become intelligent by using different solutions to control vehicle dynamics, including Brake-by-Wire technology.

Safim's R&D department aims to provide an electronically controlled braking system capable of interfacing with autonomous driving vehicles. Pure Brake-by-Wire is being studied, with the technology for hybrid use already available; for example, with an operator present who can operate a mechanical brake, if required.

In practice, the operator is on board, but the electronics intervene autonomously to facilitate driving, such as braking when a situation requires it. In the agricultural sector, for example, this type of feature can be useful as an aid to steering when the tractor is at the end of the field and needs to select reverse gear. A second application is automatic speed control when the tractor is following a combine harvester during the cereal harvest. These automations are made possible by the integration of the vehicle control unit and the electronically controlled actuator.

"We are also developing Brake by Wire solutions for agricultural and work machines without operator on board - Eugenio Leati, Project Leader of the Safim mechatronics program, tells us - but the problem is more complex because the Functional Safety must be very high. In this case there must be redundant systems that intervene in case of electronics malfunction to ensure maximum safety. When autonomous driving without an operator also arrives in the agricultural sector, we will be ready".

Three other systems also at an advanced stage of development, work alongside Brake-by-Wire and are dedicated to dynamic control to improve the stability and maneuverability of work vehicles:

- **Anti-lock Braking System (ABS)**
Prevents the wheels from locking when braking occurs on slippery surfaces. Also useful if two wheels are on asphalt and two are on mixed surfaces, such as mud, grass or even ice and snow.
- **Traction Control (TC)**



Intervenes when a drive wheel loses traction, for example, on slippery ground. The traction control unit brakes the tyre that skids by redistributing power to the wheel with more grip so the vehicle can proceed.

- **Brake Assisted Steering (BAS)**

To create a narrower turning circle, for an agricultural machine for example, the brake-assisted steering system intervenes to brake the internal wheels, thus reducing the steering angle. This operation is carried out in a controlled manner to ensure maximum effectiveness but without damaging the terrain.

Eugenio Leati, Project Leader Electro-Hydraulics commented: *"To have maximum reliability today we use certified hardware from external suppliers, but the long-term project is to acquire the skills to design customized software and hardware internally. In this way, we will have our own intelligent actuator able to integrate mechatronically with both the hydraulic and mechanical components, as well as the electrical and electronic components for the Safim Smart Braking system. At the moment, we are developing our projects together with two highly specialized and reliable companies. We are developing the entire system in collaboration with leading scientific and technological partners, specialized in advanced engineering solutions for the automotive, agricultural, heavy-duty and industrial sectors."*

The Safim Smart Braking system can be used for a variety of applications, including agricultural machines, MMTs, mining vehicles, military vehicles, and road cleaning vehicles.

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