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# The next step in hydraulics and electronics

**A**s we celebrate 100 years of SAE's contributions to our industry, it seems very appropriate to look forward at the next few years and assess where we will be. In the off-highway segments it is easy to see the need for more efficient machines that use less fossil fuel and operate at least partially autonomously. How we satisfy these needs will be our challenge.

From **Sauer-Danfoss's** perspective, this challenge will require reinventing the industry. No longer will engineers be applying products from current portfolios, nor will technologies follow the trends of the past. Instead, it is necessary to envision the future to see what unfolds.

Control systems, including GPS devices and displays, are rapidly evolving, improving in power, quality, and especially in cost and reliability. At Sauer-Danfoss, the future is in sight and our engineers are managing new product developments and acquisitions to meet the needs of this rapidly evolving environment.

Farmers will be high-tech entrepreneurs using all the GPS and field mapping tools on every piece of equipment in their arsenal. The complexity of this equipment will undoubtedly be very high, but equally, the reliability and durability of the equipment will improve many times from the levels available today.

Service and support will come via cellular technology and farm-based LANs where each piece of equipment will communicate with the others, all of the time. Cellular uplinks of data will be offered to service companies who will give the farmer reports and requirements about logistics and commodity prices, providing the customer with the optimum profit margins. And as these control and management tools evolve so will the

technologies that get the power to the ground and to the tools. Fuel cells and other power sources will evolve to the point where hydraulics and fluid power will be mightily challenged and will only remain where it is the best power-transfer solution.

We believe high-power, high-density electric motors and e-linear power devices will replace many of the products and systems built today using hydraulics. This revolution will be happening not only on the farm but also in every corner of the off-highway market. In fact, it already has started.

Technology innovations such as PLUS 1, released at Bauma this spring, are indicative of Sauer-Danfoss's investments to meet these needs. PLUS 1 encompasses a family of controllers, displays, input devices, and hydraulic and electric products that all work in unison with the engine as well as with the customer's existing controls. PLUS 1 technology directs the total vehicle propulsion, work, and management systems regardless of the technology chosen to do the work. Adding ac and dc motors to our product/systems family last year was another bold step.

The real beauty of PLUS 1 is the capability of the machine designer to develop the machine's control functions and turn them into proprietary control code without needing a control software programmer or special code from the supplier. This design feature allows the machine manufacturer to differentiate his product from the competition's and keep the "fingerprint code" his own.

We are all headed for some exciting times as we move into this next generation of technologies, where everything we know and all we have learned will be challenged. Here at Sauer-Danfoss, we look forward to the challenge. **OHE**



PLUS 1-based display.



PLUS 1 network module.