System **keeps driver focused** on the road

Moroccan government **fuels growth** of **auto sector**

Technology breakthrough **reduces costs of driverless cars**

Transforming **EVs into mini power** stations

Fuel measurement system goes mobile

" There was a need for a system to cover large heavy duty engines with a good vapor separation without losing response time. **– Peter Kaub, President and Founder of Re-Sol. Page 20**

> "The RS438-200 combines the ability to switch from a closed loop system for fastest response time and smaller engines to open loop system for very large engines."

Mobile units speed up fuel testing

By: Cliff Parish

Fuel consumption testing equipment needs to provide accurate information in an increasingly complex environment, with the introduction of biofuels and new generations of diesel.

Established in 2003 to meet high demand for in-depth fuel consumption measurement expertise Reliable Solutions or Re-Sol is keeping pace with the changes needs of the market-place. Re-Sol has introduced the RS438-200 Diesel Flow Measurement System as part of its RS400 Mobile Fuel System family. The system is designed to cover a wide range of diesel and bio-diesel applications. The fuel measurement sensor is based on the Coriolis principle. A preheating circuit assures that engines with little recirculation flow can reach required fuel temperature after a very short time. The integrated vapor separator can be switched from open to closed loop mode to accommodate best transient behavior and best vapor separation.

Peter Kaub, President and Founder of Re-Sol.

AC pumps are selected to assure long durability. The outlet pump is VFD controlled. Options include a variety of interfaces (Ethernet, AK, CAN) and also stainless steel regulators and solenoid valves. The system can be packaged with and without enclosure.

The company says that its RS400 Mobile Fuel Systems adds flexibility while improving measurement capabilities for test cell fuel consumption measuring. By mounting the measurement system on mobile stands, test engineers are no longer locked into wall mounted "one-size-fits-all" measuring systems. Now with an RS400 Mobile Fuel System the fuel system can be moved between test cells. This allows the ability to have fuel systems specifically designed for different testing, such as fuel type or measurement range.

It also allows greater flexibility in test cell scheduling. Having the system very close to the engine means fuel lines are shorter,

reducing the volume of fuel in the measurement lines. This improves the accuracy of the measurement while also improving the ability to control fuel temperatures.

A case study on the company website, showcases how a large engine manufacturer's system in its emissions certification lab was creating delays in the test schedule and increasing costs due to unscheduled downtime. Between 30 - 40% of the cell downtime was due to the fuel measurement system, resulting in an average of 10% monthly downtime. With the cells booked at 100% and non-flexible deadlines, this caused a cascading effect on costs and scheduling.

Peter Kaub, President of Re-Sol, met with the emissions testing team and worked with them to provide the right solution for their testing needs. According to the Manager for the test cell, "Re-Sol definitely went above and beyond to keep us up and running". Since the installation of the Re-Sol fuel measurement system in December of 2009, the customer has not had a single day of downtime related to the fuel measurement system, recovering up to $80,000 in annual billable cost for the test cells. Along with these savings is the reduction in overtime and disruptions of the schedule, according to the website. Re-Sol works with a variety of diesel powertrain testing applications and industries. It has extensive experience in the gasoline engine testing industry. Typical applications for gasoline are single cylinder engines, direct injection, returnless fuel injection systems, ethanol, and electric hybrid engines. The company also works with the off-road mobile industries, including, snowmobiles. Its range covers military fuels, oil, and transmission fluids. Fuels include biodiesel, gasolines and ethanol blends JP8 and E85.

Automotive Industries asked Peter Kaub, President and Founder of Re-Sol, what makes the Re-Sol RS438-200 Diesel Flow Measurement System an important addition to the company's RS400 mobile fuel system family.

Kaub: There was a need for a system to cover large heavy duty engines with a good vapor separation without losing response time.

The RS473 mobile multi fuel flow measurement system.

The RS438-200 diesel fuel flow measurement system.

An automatic fuel flow calibration cart.

Assembling a system.

AI: What are some of the features that make it different from other fuel measurement testing systems available?

Kaub: The RS438-200 combines the ability to switch from a closed loop system for fastest response time and smaller engines to open loop system for very large engines where vapor is returned to the fuel flow measurement system. It has also an engine supply pump, which is controlled by a variable frequency drive (VFD). Making this system mobile allows the customer to move it between test cells.

AI: What are some of the breakthroughs Re-Sol has made in gasoline engine testing and how has the industry reacted to these?

Kaub: Re-Sol has been working on systems for gasoline engines, especially where there is significant ethanol content, for many years. The fact that these engines do not have a fuel return from the engine back to the tank allowed us to optimize the system with a minimum number of components downstream of the flow meter. This resulted in an excellent low flow capability for engine idle studies. All these systems have an electronic pressure control. Newer developments are covering GDI (Gasoline Direct Injection) applications. Customers are demanding pressures up to 50MPa. This is often needed for single cylinder research, where the high pressure pump is not mounted on the engine.

Members of the Re-Sol team in the high-tech workshop.

AI: Give us some examples of auto companies that have/ are using your testing systems and the cost savings they have made.

Kaub: Re-Sol's solutions can be found at every major automotive manufacturer here in the US. This is true also for the component suppliers, which have to analyze how much their component is influencing the fuel consumption of the vehicle. That includes manufacturers of radiators. Due to the reliability and mobility of the systems, the downtime of each test cell was reduced. If components do break, Re-Sol's customer support team aims to get the customer back on line within a day. Another cost reduction for a customer was the introduction of the family of calibration carts, which come in a variety of configurations.

AI: What differentiates the customer experience with Re-Sol – how does your company work alongside your automotive customers?

Kaub: Re-Sol is putting a major emphasis on fast response to customer's need. This goes beyond the regular office hours. This is also true for the calibration service, which Re-Sol is offering since its ISO17025 accreditation. This service includes on-site support.

AI: How has your previous experience in the industry influenced the way you run your company?

Kaub: I have been involved in the fuel flow measurement field since 1984. During the course of the time I realized that it is not only important to have an excellent flow meter, but also packaging it to suit the customer's need. This includes data interfacing. To get it right, the company and designers need to be connected with the customer from the time he recognizes the need for the solution until the time the system is signed off. Re-Sol also assists with the writing of system specifications.

AI: What are some of the differentiators when testing alternative fuels and how has Re-Sol had to change strategy in this field?

Kaub: Alternate fuels mostly require equipment to be corrosion resistant, and to have seals which are compatible with the different type of fuels. If you talk about gaseous fuels like CNG or even LPG, then a completely different product line had to be developed. Re-Sol has also delivered systems and components for these applications. **AI**

The **science** behind **display** fonts for in-car screens

By: Esther Francis

It's not something most drivers think about (unless there is a problem) – the fonts on their in-car navigation systems, infotainment systems and other human-machine interfaces. But it is a critical feature which determines both ease of use and aesthetics.

Helping automotive engineers, designers and product managers take control of their human to machine interface (HMI) designs is Monotype, a global leader in typeface technology.

In January 2015 the company introduced its Monotype® Spark™ solution which enables designers and engineers to create a product with high-quality scalable text interfaces in low-end platforms with limited run-time memory. "Today's consumer demands a high-quality user interface (UI) on their devices – whether it's the dashboard in their car, their new wearable fitness device or medical device like an insulin pump," says Geoff Greve, vice president of type operations at Monotype. "Until now, designers and engineers were limited in their ability to create a flexible, scalable text display in low and mid-end devices without doing a substantial amount of work or investing a lot of money in

Oxygen Monitor

additional hardware or memory. Our new Monotype Spark solution not only makes the type on these devices more beautiful, but it also enables product manufacturers to keep development costs low and create an easy path to scale devices to support new languages and character sets in the future."

Automotive Industries (AI) asked Dave Gould, director of product marketing for Monotype to tell us more about Monotype Spark.

Gould: In a nutshell, The Monotype Spark solution brings the power of scalable type to screens of any size or resolution – ensuring that type looks good on every screen. With the Monotype Spark solution we're able to give an OEM's user interface a more modern look and feel, while keeping hardware/memory costs low.

iType Spark software enables designers and engineers to scale and render glyphs from TrueType® font files, complete auto hinting in real time, and create monochrome and 8-bit grayscale outputs – using a much smaller footprint than traditional solutions.

WorldType Shaper Spark provides the necessary shaping and support that OEMs and suppliers will need to accommodate world languages. WorldType Shaper Spark easily integrates into existing technologies, eliminating the need to re-architect the current layout and rendering technologies. Fonts included with the product are Latin, Chinese, Japanese, Korean and Arabic.

AI: Does this open opportunities in the lower end of the market?

Gould: Yes, designers and engineers can now produce beautiful, legible and scalable text interfaces and infotainment systems for products like low- to mid-end automotive clusters and displays without the worry of investing in additional hardware or memory. The Monotype Spark solution allows designers and engineers to create low-cost, high-quality interfaces that enable scalable, smooth text and support various languages and font sizes in low run-time memory configurations.

AI: How did your auto solution, created for high end heads-up displays, auto clusters and infotainment systems, adapt to low to mid-range cars?

Gould: We developed Monotype Spark in response to a customer request. We had a supplier working on a project for an OEM manufacturer, and the supplier wanted a solution that offered scalable text without the need for additional hardware and CPU memory. We took two of Monotype's popular software technologies for higher end automotive clusters and displays, iType and Shaper, and re-architected them to address the constraints relating to small run-time memory, code size, and CPU platforms.

We determined early in the process that getting the engine to work using such a small amount of memory would require significant changes to the software. We also knew that some of these changes could adversely affect the rendering quality and, potentially, the performance of the solution. That said, the first step we took in architecting the Monotype Spark solution was to work in extremely low-memory conditions. We established memory and performance baselines, along with thousands of reference images of characters from various fonts and languages that customers could use with automated tools later on to check for rendering anomalies.

The next step was to identify and remove all but the absolute core functionality from the engine. When completed, all that was left was engine initialization, setting font and size information and getting glyph and metrics information. For any basic text rendering

Low-to Mid-End Automotive Cluster.

The challenge of providing easy to read interfaces stretches across all devices.

systems these are bare-essential features required to scale and render text from a standard TrueType font file.

Once we had a functioning font engine with all the necessary features, we turned our attention to our baseline data, code analysis tools and the expert eye of native language readers. In parallel, the development team identified areas of memory-intensive code that and rewrote them to use less memory. Simultaneously, our quality assurance team ran comparison tests of the new font engine output against our reference images looking for anomalies that were unacceptable to the native reader. All anomalies were addressed by a new lightweight runtime hinting technique created specifically for this engine. In the end, many of the code changes necessary to achieving the smaller memory requirements centered around how the font tables were handled during processing. For example, a font file consists of many tables linked together internally. To process this data, the Monotype Spark solution does not load these tables into runtime memory. Instead, it will read the data directly from the font file located in read-only memory, thus eliminating the need for large amounts of runtime memory at the expense of reading from slower read-only memory.

AI: What challenges does Monotype anticipate in connected cars?

Gould: In the connected car, instrument clusters and infotainment systems must deal with unpredictable text because it's coming from an outside, online source. Therefore, the font solution needs to support international language capabilities and full character sets, in addition to scalable, highly legible fonts.

The automotive cluster and display markets are both primed for growth. In the connected car, instrument clusters and infotainment systems must deal with unpredictable text because it's coming from an outside, online source. Therefore, the font solution needs to support international language capabilities, full character sets, in addition to scalable, highly legible fonts. The way we see it, OEM and Tier 1 suppliers will need the following to accommodate consumer demand:

- A cost-effective way to make the jump to scalable text without increasing the cost of the platform (memory, CPU)
- A flexible solution that supports complex scripts and uses minimal memory
- A solution that allows them to easily design, implement, make changes to font/text
- A solution that is easy to integrate into an existing platform without additional costs to do so

- The ability to work with more languages and text sizes
- A path to grow, enhance their product line
- The ability to make text look smooth on color displays
- Access to industry leading, highly legible typeface designs

The Monotype Spark Solution helps address these requirements and:

- Reduces runtime memory and leverages a fully scalable solution to achieve high quality text in various sizes and languages
- Offers larger character sets enabling customers to scale a product line quickly, cost effectively
- Helps customers deliver a more flexible solution in a lower-cost platform configuration – providing Tier 1 OEMs a competitive solution against other Tier 1 OEMs
- Provides upgrade path for customers looking to create a scalable product line (low end – high tier) with different levels of script handling
- Helps engineers and designers get product to market more quickly, by providing more flexibility in responding to customer requests as it pertains to fonts and languages

AI: How will your research study with MIT help formulate future strategies for your automotive customers and languages?

Gould: Research sponsored by Monotype and performed jointly by Monotype and the MIT AgeLab, points to the potential importance of choosing the right typeface design when legibility at a quick glance is important. This research and the expertise of the Monotype team can provide insight to customers designing automotive devices such as automotive clusters and head-up-displays.

AI: How is Monotype helping designers to meet legislated distraction guidelines?

Gould: Legibility is the key to an effective automotive typeface in a glance-based environment. Monotype's involvement in legibility and automotive research has helped inform the industry on the ideal typeface attributes for use in the car. A glance-based legibility test can be utilized to help designers and engineers balance the subtle tradeoffs between typography and interface characteristics, while seeking to optimize the demands placed on the driver. With the advancing use of digital displays in vehicles, efforts to objectively evaluate legibility and different interface characteristics may help automakers better meet governmental distraction guidelines, while providing the driver with an enjoyable experience from the showroom to the road. Full results of the latest legibility studies are available as MIT AgeLab white papers. **AI**