Tech Focus

Volume 2, Issue 1

Focusing on the advancement of dynamic measurement technology

New sensor system measures dynamic camber angle

New advancements in ride height measurement from CORRSYS-DATRON now enable precision measurement of dynamic camber angle. The most recent addition to the CORRSYS-DATRON line of Non-Contact Ride-Height Sensors, the HT-250, weighs just 90 g, and is designed to be mounted on the vehicle wheel. Highly accurate and robust by design, this compact sensor provides distance resolution to 0.1 mm, at a sampling rate of up to 6500 Hz.

Like the larger CORRSYS-DATRON HT-500 Sensor, the HT-250 Ride Height Sensor functions via the principle of optical triangulation. Both the HT-250 and the HT-500 utilize a visible red laser that is focused onto the test surface. Light projected by the laser source is reflected by the test surface and collimated onto a linear CCD array within the optical component of the sensor. The distance between the sensor and the test surface is instantaneously calculated by the sensor electronics, providing a signal that is directly proportional to the measured distance/height.

CORRSYS-DATRON HT-250 and HT-500 Sensors are optimized for static and dynamic measurement of ride height and displacement, as well as dynamic measurement of pitch and roll angle. In addition to the aforementioned applications, the smaller and lighter HT-250 also provides outstanding accuracy in tire deflection measurement.

HT-250 and HT-500 are both equipped with analog signal outputs and mount in seconds using standard CORRSYS-DATRON mounting systems. Complete details and performance specifications are available online at **www.corrsys-datron.com**.

Accurate dynamic camber angle measurement

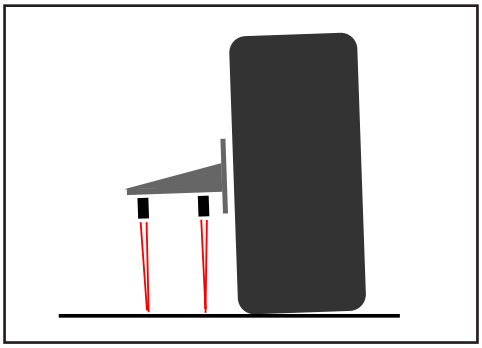
Camber is the angle of the wheel relative to vertical, as viewed from the front or rear of the car. If the wheel leans in towards the chassis, it has negative camber; if it leans away from the car, it has positive camber. The cornering force that a tire can develop is highly dependent on its angle relative to the road surface. As a result, wheel camber has a major effect on the ability of the vehicle to hold the road.

Using two HT-250 Sensors mounted on the vehicle wheel, accurate dynamic measurement of wheel camber is at last a reality. This ingenious new system acquires exceptionally accurate dynamic wheel camber measurement values by comparing the relative change in height between the two sensors, as measured from the optical plane of each sensor to the surface of the road or track.

The new CORRSYS-DATRON Dynamic Camber Angle Measurement System acquires dynamic wheel camber values by comparing the relative change in height between two HT-250 Sensors.

The ability to measure dynamic camber angle accurately is crucial to effective suspension design. In both racing and passenger car applications, knowledge of camber angle is imperative. Due to forces created by driving maneuvers, static camber angle cannot be assumed to correspond to dynamic camber values, which change continually as the vehicle is driven. For example, as a vehicle travels through a corner, camber angle values will change for any car that is equipped with independent suspension. Camber angle also changes dynamically as the suspension moves up and down.

In the past, suspension tuning, as it relates to camber angle adjustment, has been an often-imprecise, best-guess scenario. With the introduction of dynamic camber angle measurement capabilities using two HT-250 Ride Height Sensors, CORRSYS-DATRON again advances the science of vehicle testing and evaluation.



The relative change in height between two HT-250 Sensors is measured from the optical plane of each sensor to the surface of the road or track.

CORRSYS-DATRON introduces new non-contact sensors

Smaller, lighter sensors offer increased functionality, ease of use for non-contact measurement of longitudinal and transversal dynamics

The tradition of innovation that has consistently defined the state of the art in dynamic testing technology continues at CORRSYS-DATRON. With the introduction of its most recent generation of non-contact sensors, CORRSYS-DATRON again establishes a new benchmark for testing instrumentation.

CORREVIT® Optical Technology continues to evolve

The new CORREVIT® SF II and SF II P Non-Contact Sensors for slip-free measurement of longitudinal and transversal dynamics represent the next step in the evolution of CORRSYS-DATRON's highly regarded CORREVIT® Optical Sensor Technology. These two new sensors, the CORREVIT® SF II and SF II P, further extend the capability of the Formula 1-proven SF Sensor.

Like the SF Sensor, the SF II Sensor weighs a mere 180 g. The SF II P Sensor, which weighs just 250 g, offers additional output capabilities, including 4 analog and 4 digital outputs, enabling simultaneous measurement of longitudinal, transversal and magnitude speed, as well as angle.

Because both sensors are exceptionally lightweight by design, they are ideal for applications that require mounting on the vehicle wheel. Foremost among these applications is tire slip angle, which is an important component of many crucial measurement applications, such as ESP (Electronic Stability Program) testing.

APPLICATION:
ESP Testing

CORREVIT® SF II and SF II P Sensors are ideally suited to the measurement of understeer and oversteer in ESP testing. Among the variables measured are:

- Transversal acceleration
- Longitudinal acceleration/deceleration
- Sideslip angle
- Longitudinal and transversal velocity
- Slip angle of front and rear wheels

For additional information about optimizing the accuracy of ESP testing, NHTSA fishhook testing, and other dynamic measurement applications, visit www.corrsys-datron.com/application_notes today.

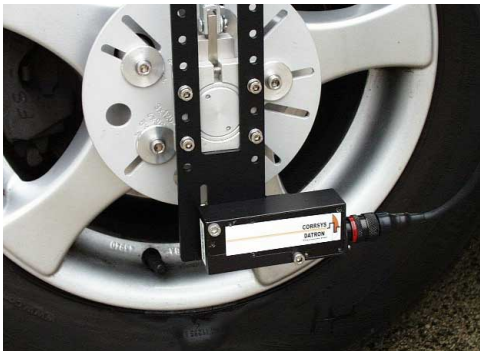
Compact and robust by design, both the SF II and SF II P Sensors enable mounting positions – such as under the vehicle – that were virtually unimaginable until now. Long-life, vibration-resistant infrared LED illumination and digital filters with advanced DSP technology provide improved performance, even under harsh environmental conditions.

Both sensors feature high-speed data transfer via CAN Bus, RS232 and USB, and can be used with all current data acquisition systems. The newly available USB output also enables direct connection to PC or laptop

The SF II P is configured with a protective optical-glass lens that prevents damage to the optics and the illumination source. The lens is optimized to the wavelength of the LED illumination source, and can be easily replaced without use of special tools.

Durable and easy to use, the SF II and SF II P Sensors offer speed linearity of <±0.5% of the measured distance and distance linearity <±0.2%. Distance resolution is an outstanding 2.08 mm. Illumination is provided by via long-life, high-power infrared LEDs.

The new magnetic Quick Mount System for all CORREVIT® LF and SF Sensors



The CORREVIT® SF II P Sensor enables simultaneous measurement of longitudinal, transversal and magnitude speed, as well as angle.

CORREVIT® SF II & SF II P
Non-Contact Optical Sensors
Features and Specifications

- Small and lightweight
  SF II weighs 180 g
  SF II P weighs 250 g
- Developed for measurement of tire slip angle
- Speed range from 0.3 ... 250 kph
- Mounts in minutes
- Adjustable filter time (unfiltered, 8 ... 512 ms)
- Speed linearity - desired distance < ± 0.5 %
  Distance linearity < ± 0.2 %
- Improved features by application of advanced DSP technology
- Mounting angle correction via software
- Direct connection to PC or other data acquisition and evaluation systems
- Illumination by long-life, high-power infrared LEDs
- Signal outputs: analog -10 ... 10 V
  digital 0-1000 pulses/m
  CAN Bus V2.0B
  USB 2.0 or RS232
- Negligible service and maintenance requirements as a result of durable technology
- Tested and used under extreme environmental conditions

Tech Focus

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Advanced digital technology increases measurement accuracy in challenging testing conditions

CORREVIT® Optical Sensors from CORRSYS-DATRON are widely considered as the standard for accuracy in dynamic speed and distance measurement. CORREVIT® Sensors are used by virtually every major auto and auto-related manufacturer in the world for testing of chassis and suspension set-up, tire performance, ABS and ESP braking performance and driving behavior.

Now, with the addition of new, advanced DSP (digital signal processing) and FPGA (field-programmable gate array) technology, CORREVIT® Optical Sensors can offer even greater accuracy.

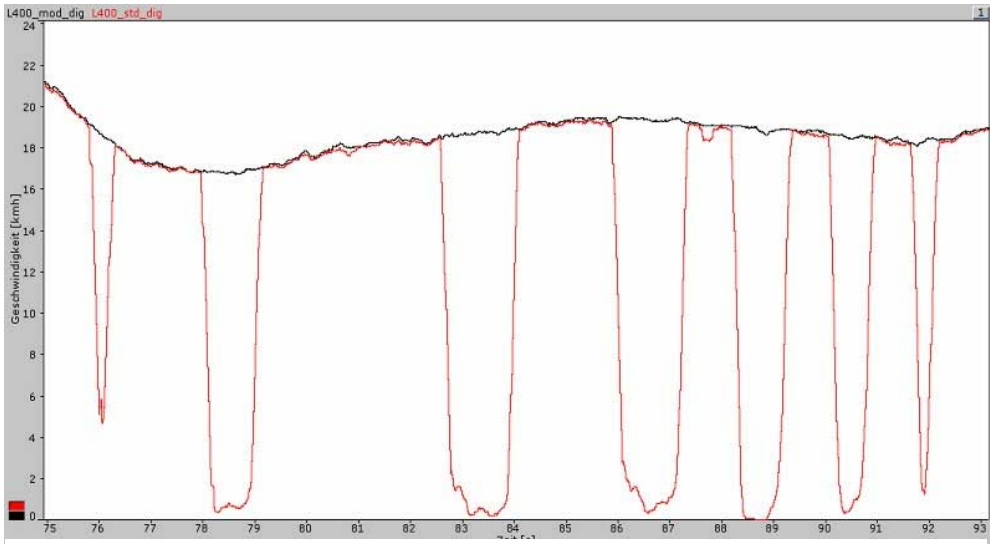
FPGA – an overview

An FPGA is an integrated circuit that incorporates from thirty-two to literally millions of identical logic tiles (also called cells) which are interconnected via a matrix. Each of the many tiles that comprise the FPGA consists of several thousand transistors. A simple logic function is assigned to each tile, and the tiles are selectively switched on or off to create logic circuits. This architecture enables the design of specialized circuits with massive computing capacity.

Unlike most integrated circuits, the FPGA is programmed by the user, rather than by the circuit manufacturer. This characteristic enables the creation of highly complex, application-specific capabilities, while significantly reducing the high engineering costs that are typically associated with integrated circuit designs.

Intelligent filtering

The FPGA now incorporated in many new-generation CORREVIT® Optical Sensors enables the implementation of powerful digital signal-processing functions, such as intelligent filters for Fourier analysis. The digital filters act in a linear fashion on the measurement signal by forming weighted sums of the signal, and also of past values of the output of the filter. Ultimately, Fourier filtering produces frequency domain information that provides a more accurate representation of the measurement signal.



So what does this mean to the vehicle testing engineer? In short, the new generation of CORREVIT® Optical Sensors sensor produces higher accuracy when measuring on so-called "difficult" surfaces, such as water-covered test surfaces found in aquaplaning testing.

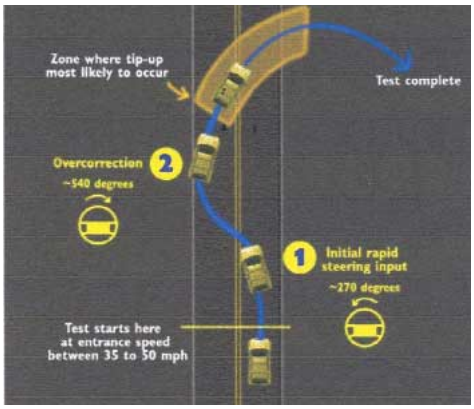
To illustrate the significant effect of FPGA and DSP on measurement accuracy, two CORREVIT® L-400 Single-Axis Optical Sensors were used to measure vehicle speed on a wet test surface. The black trace represents the speed signal of the new L-400 Sensor (equipped with FPGA/DSP). The red trace represents the speed signal of an older L-400 Sensor. As is clearly illustrated, the black trace (new sensor version) exhibits no signal loss.

To learn more about testing on flooded surfaces, and a wide range of other dynamic testing applications, contact the experts at CORRSYS-DATRON today.

Additional information about aquaplaning testing is also available at **www.corrsys-datron.com/application_notes.**

APPLICATION: *NHTSA Fishhook Testing*

- **The Fishhook test was developed by the NHTSA in the USA to evaluate vehicle safety in rollover tests.**
- **The testing results are used for vehicle evaluation.**
- **The Fishhook test is applied to measure the speed at which the wheels lift off the ground (< 4 cm), before the vehicle rolls over.**
- **The path the vehicle follows is shaped like a fishhook, which gives the test its name.**



A new, complete rollover testing system is now available from CORRSYS-DATRON. To learn more, contact the experts at CORRSYS-DATRON today.

Contact CORRSYS-DATRON today for more information about these and many other outstanding dynamic measurement solutions.

www.corrsys-datron.com

CORRSYS-DATRON Sensorsystems earns ISO 9001:2000 certification

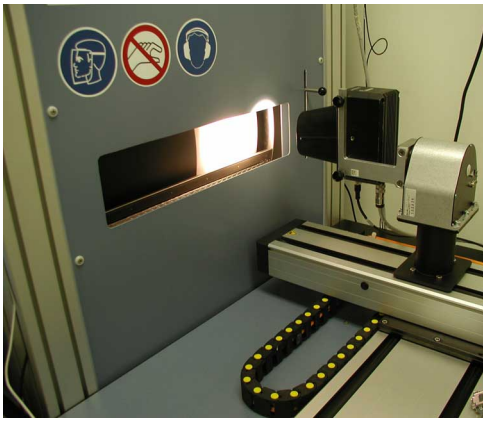
CORRSYS-DATRON Sensorsystems, Inc. is proud to announce that it has earned ISO 9001:2000 certification for its North American headquarters. "CORRSYS-DATRON has always held a very strong reputation for providing category-leading products and services. This certification serves to further confirm our commitment to bringing our users a consistently outstanding level of quality," states Klaus Weimert, Managing Director of International Operations for CORRSYS-DATRON Sensorsystems, Inc.

As the world's leading developer of international standards, ISO (International Organization for Standardization) is a global network that identifies and develops standards for business, government and society. The organization develops these standards in partnership with each of the applicable sectors, adopts them based on recognized procedures and delivers standard sets to be implemented worldwide.

Formerly known as ISO 9000 certification, the recently revised ISO 9001:2000 certification earned by CORRSYS-DATRON represents a more refined set of international standards that specify requirements for products, services, processes, materials and systems, as well as for conformity assessment, managerial and organizational practice. "Among the areas examined in the process of earning this certification are the methods used for the calibration of our CORREVIT® family of non-contact optical sensors," Weimert explains. "We have made a very considerable investment in equipping and staffing a state-of-the-art calibration laboratory at our North American headquarters. This facility is designed with a single purpose: to ensure the highest possible standards of accuracy in calibration. The standards applied at the North American calibration laboratory are based on those we have developed at our headquarters facility."

Located in Southfield, Michigan, the facility serves not only the massive automotive manufacturing base located in and around the Detroit area, but the entirety of the company's user base in the North and South American continents, as well.

"Like our sensors, which we continue to refine and improve, the techniques of calibration become increasingly precise over time," Weimert continues. "Our decision to seek, and ultimately to earn ISO 9001:2000 certification is a tangible statement of our dedication to excellence, and to meeting the needs of our end users."



Inside the CORRSYS-DATRON North American calibration lab. This facility is designed to ensure the highest possible standards of accuracy in calibration.

NEW SENSOR:

RV-4 Wheel Vector Transducer designed for simultaneous measurement of all wheel positions and orientations

The CORRSYS-DATRON RV-4 Wheel Vector Transducer measures dynamic wheel position with respect to the vehicle body. Based on the design of the proven CORRSYS-DATRON RV-3 Wheel Vector Transducer, the new RV-4 model is significantly lighter and easier to handle than its predecessor, and provides higher signal quality.

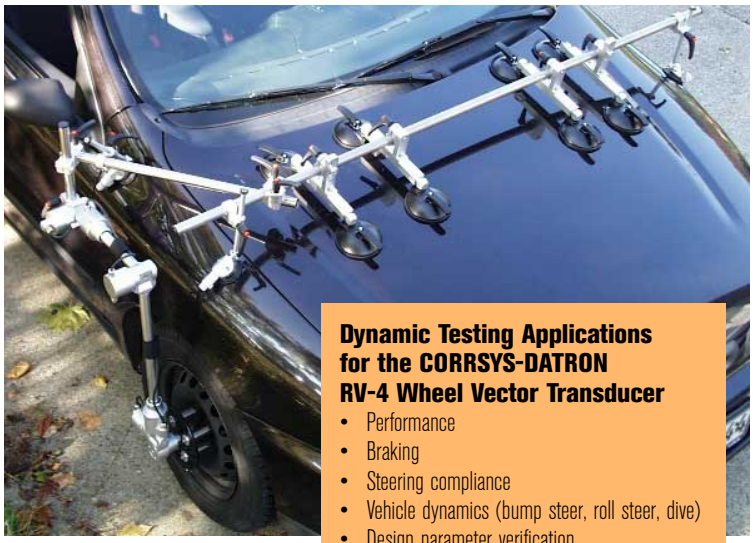
Among the dynamic parameters measured by the new RV-4 Sensor are camber and toe, vertical wheel displacement (suspension travel), lateral and longitudinal deflection, wheel turn angle, and all wheel movements in the x, y, and z axes. Also new is the RV Interface Unit with CAN, for use with either one or two RV Sensors.

Rugged, lightweight design

The precision-built RV-4 Wheel Vector Transducer is designed to meet the demands of real-world dynamic vehicle testing. For example, the angle transducers can be repeatedly turned 360° without damage, allowing unlimited vehicle turning radius. The RV-4 is also resistant to splash water, engine oil and anti-freeze.

The RV-4 System is designed to mount in minutes, using a universal suction-mount system and specially designed lug-nut clamps.

The RV-4 provides an important basis for the evaluation of body component dimensions (e.g. wheel wells and fenders), tires, wheels, suspension, dynamic self-steering properties and more. For additional information about the capabilities and availability of the new RV-4 Wheel Vector Transducer, please contact your nearest CORRSYS-DATRON applications specilist.



Dynamic Testing Applications for the CORRSYS-DATRON RV-4 Wheel Vector Transducer

- Performance
- Braking
- Steering compliance
- Vehicle dynamics (bump steer, roll steer, dive)
- Design parameter verification
- Dynamic wheel position measurement
- Rear-wheel tracking