

2012 FORMULA STUDENT WINNERS OPT FOR PENNY + GILES SENSOR TECHNOLOGY

Tuesday 6 November 2012

With regional support from its Swedish distributor AB Elwia, Penny + Giles – a business group of Curtiss-Wright Controls and designer and manufacturer of position sensors, solenoids, and joystick controllers – has supplied its SRH280DP rotary position sensors and TPS280DP throttle position sensors to the Chalmers Formula Student team, which competes in the Formula Student racing car series.



This testing ground for the next generation of world-class engineers, challenges university students from around the world to design and build single-seat racing cars with the aim of inspiring each new generation, and addressing the all too apparent skills shortage in engineering.

The Formula Student team, from **Chalmers University of Technology** in Gothenburg, Sweden, consisted of 24 members, five trainees, five supervisors and a project manager and, unlike many of the teams taking part in the event, ensures that the majority of the team of project engineers (those who design and manufacture the car) are changed every season.

Against fierce competition from 130 other teams, Chalmers Formula Student finished this year's UK event (the largest in Europe) with 850.5 points to win the 2012 Formula Student title. The team were also placed third overall in the German competition.

Explaining the specification of the Penny + Giles sensors being used for its gearbox and throttle body applications, Chalmers Formula Student's Andreas Andersson – a project manager with responsibility for Vehicle Electronics – says: "Sensors installed inside a gearbox need to be rugged and robust to cope with the arduous environment caused by hot oil and vibration. The **SRH280DP** rotary position sensor, which was fitted to the closed-loop control system on the 600cc Yamaha engine and gearbox at the start of the 2011 competition, provides feedback to the engine management system and monitors gear position and selection on the team's electronic gearshift system to ensure that, as shifting occurs, the ignition is cut to create as short a shift time as possible. While other sensor solutions that we tested meant gear shift times were slow, adopting the SRH280DP and introducing a closed-loop system has eliminated the preset times and means the team can achieve the shortest shift time possible, making the system more dynamic.

He adds that other sensors can cope with these applications but the team opted for the Penny + Giles **SRH280DP** sensor because it has the advantage of contactless Hall effect technology, which is ideal for such arduous environments.

The Penny + Giles **SRH280DP** contactless rotary position sensor features a factory programmable non-contact Hall effect sensor system and provides reliable and accurate rotary position measurement in extreme motorsport environments where shock and vibration can occur. They are factory programmable to allow users to specify output signal type, measurement range (0-20° to 0-360° in 1° increments) and output direction (clockwise or anticlockwise); operate from either 5Vdc regulated or 9-30Vdc unregulated power supply; and are available with analog (0.5 - 4.5Vdc and 0.1 - 4.9Vdc) or digital (PWM) output signals.

Commenting on the change to the Penny + Giles **TPS280DP** sensors for the 2012 season, he says: "In previous seasons we had experienced multiple sensor failures and vibrations problems with the throttle position system, so having successfully integrated the **SRH280DP** into our 2011 vehicle, and knowing just how rugged they are, we decided to replace the existing sensor in the throttle body with the Penny + Giles **TPS280DP** throttle position sensor."

As well as being more durable than any throttle position sensor the team had used previously, integrating and mounting the Penny + Giles **TPS280DP** in the AT Power throttle body also proved easier than previous sensor types because it is smaller. This meant the sensor didn't have to be mounted in a specific way to make it work; and the team could choose a throttle body and sensor combination based on performance and not just fit!

The Penny + Giles **TPS280DP** sensor is specifically designed to work in harsh motorsport environments and has excellent shock and vibration resistance. Its drive and body are IP69K-rated to provide excellent protection against the ingress of dust and fluids. It is also mechanically interchangeable with many existing potentiometer-based throttle sensors using 32mm mounting centres, and is designed to interface with most common throttle body D type spindles. It uses a factory programmable Hall effect sensor with two outputs that can be programmed individually for angular range, output range and direction. It has no contacting sensor parts, which ensures zero signal degradation over the lifetime of the sensor, and has a tested life of more than 60 million operations – more than 18 times the life of an equivalent potentiometer.

Summarising, Andreas says that both Penny + Giles sensors have performed extremely well and the team didn't experience a single sensor failure throughout the 2012 season, which includes the competition and several months of arduous testing. "We have even stressed the **SRH280DP** sensor by shortening the shaft and adjusting the housing to ensure a snug fit within the gearbox, but it has still outperformed every other sensor we have tried from rival manufacturers," he says.

For the 2013 competition, Chalmers is entering two vehicles. The first is a development of its winning 2012 vehicle; the second will use an electric drive-train in the hope that the team will be fully electric for the 2014 competition.