New Rapid Prototyping Tool Chain Speeds Up Transmission Software Development

Runs on compact controller, closes gap between prototype and production

Software development costs could be significantly reduced by using a new rapid prototyping tool chain from transmission control specialists Vocis. Originally developed solely for the company’s internal use and provided as a “black-box” on prototype control applications, customers have been so impressed by the programming time saved that they have asked to buy similar systems.

The tool set operates on a Vocis TMS20 prototype transmission control unit (TCU), a device sufficiently compact and robust to permit engine bay mounting, thereby closer to a production installation than many prototype systems. Vocis provides a library of low-level software to interface the TCU to customer high-level Simulink® models. “Providing the low-level drivers eliminates a major element of the software cost and speeds up the transition from prototype to production code,” explained Vocis managing director Mike Everitt. “Customers only need to concern themselves with developing the high-level control methods and getting the calibration right.”

The Vocis low-level software library consists of two parts. First, the suite of functions allowing high-level software to access TCU hardware and key microprocessor features, and second an operating system to schedule software to run at the correct time. Customers select either a Vocis in-house task scheduler or the RTA-OSEK® operating system from ETAS™. The Vocis option provides a cost-effective approach for prototypes while RTA-OSEK® offers the appropriate level of validation for production.
Users have a choice of code generator between Simulink® Coder™/Embedded Coder® and TargetLink®. Vocis also provides a build tool to configure and control the creation of the final executable software. This tool allows easy linking of existing customer models to the low-level drivers developed by Vocis.

“Using the build tool requires only a few mouse clicks from the engineer,” said Everitt. “We provide all the necessary scripts and a GUI that guides the user through the complete build process.”

Downloading the executable to the controller is quick and easy using any XCP-based calibration tool, talking to a boot-loader supplied pre-programmed with the TMS-20. To support data-logging and calibration of customer models, Vocis provide an XCP driver as part of their low-level software enabling an engineer to easily calibrate the model and measure data using a dedicated CAN bus. The maximum data rate is 49 bytes/millisecond.

The low-level software within the tool chain includes significant intelligence based on extensive Vocis experience, such as the intricacies of clutch control, valve actuation, and various temperature compensation strategies. Customers are given the necessary calibration access to the low-level code when buying the tool set. All CAN bus communications are also via the low-level software.

The TMS20 itself has a highly adaptable architecture: its lower board contains an extensive I/O set including 16 analogue inputs, 13 switch/speed inputs and 33 outputs - 18 of which are suitable for driving solenoids requiring current feedback. The upper board contains the microprocessor only, enabling the unit to be updated when more powerful silicon becomes available. The unit has an industry-standard Tyco 121-way sealed connector.

The first customer application of the tool chain involved a respected European powertrain consultancy that was developing transmission control software for a dual clutch application. Having successfully trialled the system, Vocis now has a market-ready solution and is in discussions with other potential customers.
Vocis has an Italian partner company, Oerlikon Graziano, which has been responsible for a number of recent high profile supercar transmissions, co-developed with Vocis and using Vocis control system software.


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**Photographs**

Pictures are available electronically from the press agent or can be downloaded from [www.autopresspoint.com](http://www.autopresspoint.com)

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<th>Mike Everitt, managing director of Vocis Driveline Controls, believes the new Rapid Prototyping Tool Chain eliminates a major element of software costs and speeds up the transition from prototype to production code</th>
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