# 10th Anniversary of BiSS

Open Source - Freedom to Operate

Ten years ago, ASIC manufacturer iC-Haus GmbH unveiled the BiSS protocol as an open-source interface for automation technology. iC-Haus wanted to achieve a fast bidirectional sensor/actuator communication standard that remained compatible with the established SSI (Synchronous Serial Interface) standard. In addition to its technical merits, two conditions have led to BiSS becoming the current global standard: free BiSS license applications and the stability and continuity of the BiSS protocol since its launch. Patents brought against BiSS B have been fully revoked juridically and in another lawsuit several experts have denied the infringement allegation. As a result all pending lawsuits against BiSS were abandoned. Thus, on the 10th year anniversary of the Open Source BiSS Interface, "Freedom to Operate" is reached for the industry. This 10-year milestone provides an opportunity to reflect on the success of BiSS for vendors, service providers, and users, as well as to look forward to future applications.

The BiSS interface is a dedicated, real-time sensor/actuator interface as opposed to a general-purpose field bus. Since 2002, position sensor manufacturers have utilized the BiSS bidirectional interface to replace analog signal transmission and proprietary digital encoder protocols. "As IC manufacturer, we wanted to serve a broader market without special solutions. Therefore, there was only one way for us to implement a technically mature development: release the interface to establish an open standard," says Dr. Heiner Flocke, CEO of iC-Haus.
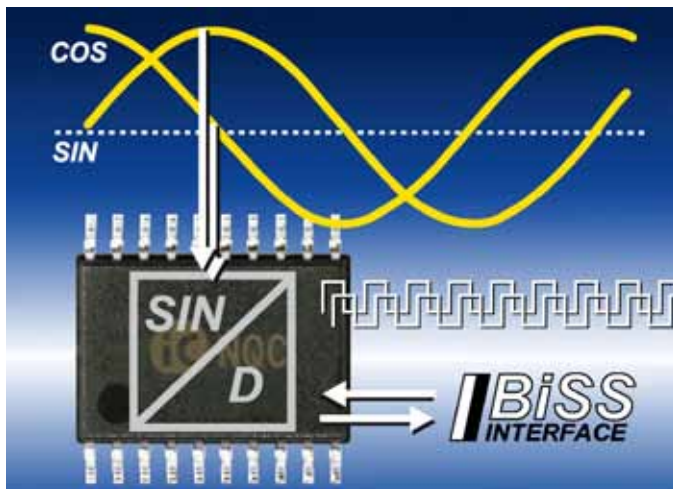
BiSS brings significant benefits to the user compared to other interfaces. These benefits include minimum hardware requirements, both for driving long cables as well as for integrating the BiSS slave function in a sensor. "BiSS uses only about 1,000 gate equivalents in the slave and can be integrated as an additional function with little space requirement and cost burden in our sensor iCs" so Flocke. The digital data transfer offers high noise immunity using only a simple two-wire link. Data transfer rates are determined by the drive electronics and allow short cycle times (a few microseconds

for 32 bits for example). "BiSS can collect data from multiple sensors with only one master and thus simplifies position detection in multi-axis systems," explains Flocke: "Sensors from different manufacturers can be used together in control systems or exchanged for troubleshooting. The user is no longer tied to a specific sensor manufacturer since BiSS is an open standard."
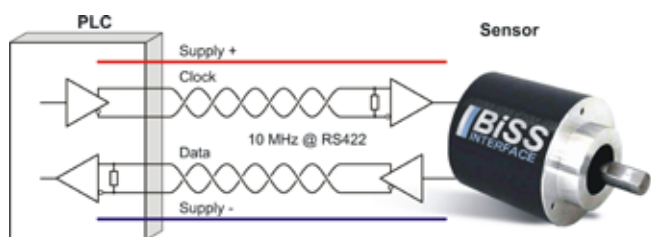
BiSS now offers Continuous Mode (BiSS C) which avoids mode switching, allowing commands can be sent from the master to a slave without interrupting sensor data flow to a drive or control. Thus, parameters can be exchanged bidirectionally between master and slaves during operation, and actuators on the bus can be controlled in real time. "Normally, the sensor data stream must be interrupted to switch modes in a bidirectional interface, which is a big disadvantage especially in high-speed digital systems such as motor feedback," clarifies Marko Hepp, Sales & Applications Engineer at iC-Haus GmbH. "Using BiSS C, a fraction of a data word is sent to the connected slaves with each packet." While the process and designs of BiSS C are patented by iC-Haus GmbH, they are still part of the free BiSS license and available to all BiSS Device Manufacturers.

With BiSS C, the BiSS interface has also spread internationally. Hepp is convinced that "BiSS has the potential to replace SSI as a compatible and additionally bidirectional interface standard. To date we have awarded more than 250 licenses to device manufacturers, including prominent encoder and control manufacturers." The free license includes use of the BiSS brand as well as the IP source code. The user decides whether or not to advertise its product on the website (www.biss-interface.com). "In addition to in-house application engineers, iC-Haus now also offer independent service providers in Germany, the USA, China and Japan for BiSS interface design and implementation," says Hepp: "We see great potential for BiSS as the global industry standard as evidenced by implementation of BiSS by the global players in drive technology. Many of these new applications will be introduced at the SPS IPC Drives show in Nuremberg, Germany."

As an independent BiSS Support Center, Bruce Pride operates his company iC-Embedded in the United States (Portland, Maine). "Based on data sheets and source code files provided by iC-Haus, we were able to implement BiSS including the FPGA and microcontroller programming at the master side for different industrial and robotic applications within 4 to 5 weeks" states Pride.

Companies using BiSS in their products include ADDI-DATA, AMO, Balluff, Baumer, Beckhoff, BEI, Berger Lahr, B&R, Changchun Yuheng Optics, D.Electron srl, Danaher Motion, Dynapar, Elmo, ESR Pollmeier, Kübler, GIVI MISURE, Hengstler, Hohner, KEB, KE Knestel Elektronik, Lenord+Bauer, Lika, LS Mecapion, Murrelektronik, Netzer, Nitek, Pepperl+Fuchs, Promicon, Renishaw, RLS, Schneider Electric Motion, TDE MACNO, Technosoft, TWK, Wachendorff, Yaskawa and more...

Renishaw is a manufacturer of length and angle measuring systems with global applications. "When we were developing our ground-breaking RESOLUTE ™ absolute optical encoder it was always part of the basic specification to make it compatible with iC-Haus's BiSS protocol. We were looking for a modern, open, pure serial interface that would meet the high performance requirements of RESOLUTE whilst giving our customers access to a wide range of motion controllers and we found the perfect match in BiSS," remarks Steve Oakes, Commercial Manager Encoder Products Division at Renishaw. "The excellent support we received from iC-Haus during product development and afterwards with customer integrations convinced us that we had made the right choice to match our own responsive global sales and support network and we look forward to a long and rewarding future together."

Encoder manufacturer Kübler has used BiSS since its early successful implementation in a compact, robust sensor system that eliminated additional analog lines and thus reduced cost. Viktor Steiner, responsible for technology development at Kübler: "Our customers wanted to get away from the conventional interfaces and be more independent and flexible in responding to the market." One is aware that it is difficult to set a new standard, but "BiSS is now properly under way," so Steiner.

Hengstler is very optimistic that in the future BiSS will further penetrate the market. BiSS is at the core of all Hengstler absolute encoders and is preferred for motor feedback applications. "Customers appreciate the benefits of the safe bidirectional BiSS as purely digital communication, dynamic line length compensation, and the possibility to read and store motor data in the encoder" reports Alexander Hess, Senior Product Manager at Hengstler.

The 10th anniversary of the BiSS interface will be celebrated at several events in November 2012, including the electronica trade fair in Munich, and the SPS IPC Drives show in Nuremberg. For more information on BiSS, please visit the exhibition stands of iC-Haus and the companies mentioned above, respectively the BiSS users, worldwide.

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