


Report			
MCD Elektronik GmbH Hoheneichstr. 52 – 75217 Birkenfeld Tel. +49-7231 78405-0 – Fax: +49-7231 78405-10 Managing Director: Bruno Hörter	Release Date: 10.04.2018	Page 1 von 8	
	Document Version: V1.4	Editor: VH	Summary Title: MCD_FA_06
For immediate publication	Queries to: Verena Hörter, Verena.Hoerter@mcd-elektronik.de		


Test System Ensures Best Entertainment on Board Multi-Million Order for Measurement Specialist MCD Elektronik

The electronic onboard entertainment is becoming an increasingly important element when choosing a car. A radio, DAB tuner and sound system already build the standard. The drive should be able to play MP3s and a slot for USB sticks should be included. In the meantime, a bluetooth interface for the phone as well as a navigation system with included maps for europe and more are expected. Multiple features can be ordered by the car buyer, using i.e. a configurator. Of course it is also expected to protect the exclusive electronics against robbery.

Some features that used to be reserved for luxury class cars are slowly conquering middle class cars as well. This increases quantities and therefore also the competitive pressure. Like many others, a well-known japanese manufacturer faced the task to optimize its production of infotainment systems. Critical factors were that the test system supports the complete production of the devices and also meets the extremely high requirements of the automotive manufacturers. The optimization potential, especially regarding the testing process, is tremendous and higher investments in sophisticated test systems are paying off quickly. The company wanted a cost-effective and future-proof solution, that could be brought into line for several tier 1 suppliers in various countries.

1. Great Opportunity for the Measurement Specialist

The manufacturers' consulting company also contacted the german test and measurement specialist MCD Elektronik. After first presentations and preliminary talks, MCD was in the final selection process along with nine other suppliers and finally got the contract. MCD's CEO Bruno Hörter: „We are proud to be associated with this project. It was a big and meaningful order in our company's history. After half a year of development time we were able to deliver the complete test line to Japan in February 2015. The

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customer already ordered additional test lines for other production facilities.“

The test content was roughly outlined by the customer. The inline test of the mainboard, the inline test of the digital tuner modules as well as the test of the complete unit with DVD player, mainboard and digital tuner defined the test scope. MCD developed an overall concept and therefore derived detailed solutions. The current module structure was formed together with the customer. „We had areas of freedom concerning the implementation and the choice of the components“, Hörter remembers. MCD could rely on its own-developed standard components. These include i.e. the AudioAnalyzer with an independent script engine to analyze the measured values simultaneously and the switchable USB hub to control the extensive USB interfaces.

2. Know-How and Creativity

Other components were newly developed for this project because no alternative products were available on the market. This included the programming of the devices via USB with asynchronous access as well as loadable via PC and this for 48 DUTs at the same time. Another component was the specially developed board, which replaces the complex wiring within the systems. This helped with the standardization process and test results were more accurately reproducible. Mechanical adaptations were simulated and tested in advance using 3D printing technology to receive optimal results. The 13-strong team who was supported by several suppliers realized the test line in a record time of 26 weeks. Various experiments with Boundary Scan solutions, fault coverage analyses as well as multiple simulations were included throughout the careful planning process.

The test line was designed with eight modular stations. Some of them are integrated directly in the production flow, while others act as offline stations.

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Each station can act on its own but is integrated into the complete test line per intelligent data handling.


3. Non-Stop Examinations

The journey of the products begins with an inline BSCAN / function test for mainboards. On this station, two mainboards can be programmed and tested simultaneously and parallel via Boundary Scan and FCT. Test and handling are running autonomously. The second station is the Inline BSCAN / FCT for DAB tuner modules. Here, 12 modules are handled simultaneously. The Boundary Scan test, the functional test and the programming of all modules take place at the same time. Test and handling run fully autonomously.

4. ...and Offline

The third station is the flashing station for 2 x 24 devices. Here, the programming of the application software follows for up to 48 devices to be tested at the same time. The programming can also be started asynchronously. At this station, the devices are already personalized according to customer requirements, therefore the barcode and data handling is very important for each individual device. Using specially developed boards with intelligent data handling the simulations of the devices follows. The flashing of the devices with data, i.e. road data for a navigation system, takes place via an USB interface with up to 64 GB on each device.

The „torture chamber“ of the test line is the RunIn station for 2 x 24 devices. Up to 48 devices are tested simultaneously in a climate chamber with endurance tests from -40° to +80° degrees. For this purpose, the head units are connected to slots of a specially developed trolley and are led into the climate chamber. During this time all device functions were tested, the input signals were simulated automatically and the outputs were subjected to different loads. Tested components were i.e. fallouts during audio play-

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back, DVD- and CD-functions as well as insertion/ejection and starting the DVD.

The automatic function test (AFT) is the next test station. Here, up to four completely assembled head units are examined. The test system is specially designed to perform functional tests of USB, WLAN and bluetooth components as well as analog and digital measurements of tuner, AM, FM, DAB and satellite reception. GPS-tests as well as the examination of video signals, fan functions, network interfaces, light performance and MOST communication can be exactly examined with this AFT. „A specially designed universal board minimizes the wiring in our functional test system. This saves working hours and reduces the potential of failure or material defects“, Bruno Hörter explains. The software recognizes free test potential and automatically optimizes the test run. Therefore each individual employee can operate on four test stations at the same time.

5. The worker is also in Demand

The manual functional test (MFT) has a special position in this test line. It is the workplace of employees, who examine the devices in a customer-oriented way. They check the devices from the user's point of view, examine audio tests via headphones and check the DVD functions manually. Through a connection of automobile displays as well as controls, like steering wheel switches, two devices can be stimulated manually as well as semi-automatically. The „Electronic Manual“ supports the operators with image and video elements in the respective language. Therefore, the test station can be adjusted according to local needs depending on the production site.

Mutiple camera systems examine the device and an image processing software checks the completeness. All plugs are checked for presence and the correct pin alignment. The colors of labels and the presence of the exact barcodes and stickers are also tested. In addition to that, it is exa-


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mined if the cooling pads for the electrical circuits are mounted correctly or not. The housing, the guide rails and the fixing elements are measured. This also includes the completeness check of screws and clips. Finally, the DVD mechanics and the insertion slots are tested.

The real interface to the automotive manufacturer is the delivery station. Here, the configuration for the use in the target vehicle takes place using the customer software. It includes the programming of production data and the configuration for just-in-sequence delivery. Diagnostic data, equipment, options within the device, operation site, versions, dates etc. add to the data provided by the customer.

6. Complete Transparency

All diagnostic data of the DUTs are processed in a complex program and are always available using a long-term memory for an inspection at the manufacturer. The test system is regularly maintained to avoid false diagnosis. For instance, the measured test data is processed via MCD's Data Manager and the stability as well as the preliminary results are checked. A calibration of the measured values takes place with test runs of so-called „Golden Devices“. The permanent trend analysis via MCD's Data Manager indicates probable gradual changes. This software is connected to the Manufacturing Execution System (MES) of the infotainment supplier via interfaces and builds the bridge between technical/physical and the economic world.

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Pictures:

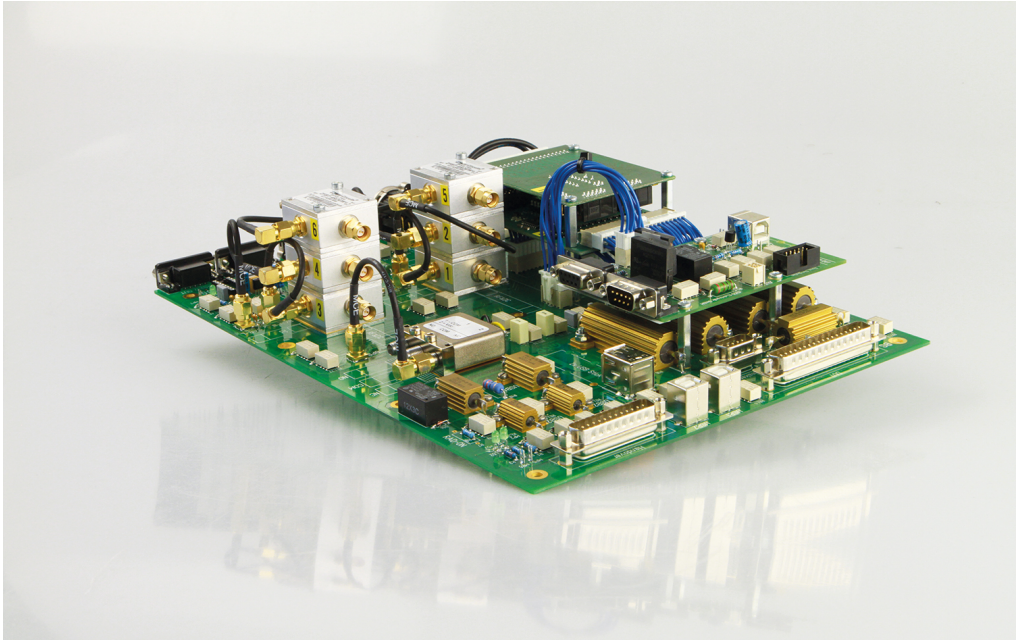


Picture 1: „System-Panorama“: On overall eight stations the components as well as completely assembled products are examined.




Picture 2: Manual Functional Test with two operating stations.

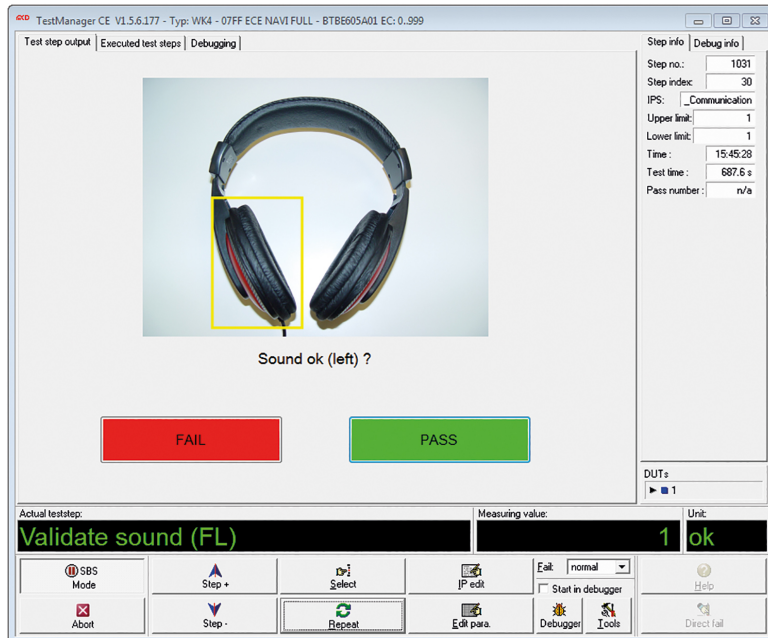
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Picture 3: The specially designed board minimizes the wiring within the functional test station. This saves working hours and reduces the potential of failure or material defects.



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Pictures 4a and 4b: The „Electronic Manual“ supports the operator with image and video elements in the local language.

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About MCD Elektronik GmbH:

MCD Elektronik GmbH was founded in 1983 and currently employs 80 people. The owner-managed company is headquartered in Birkenfeld, near Pforzheim, Germany. MCD Elektronik is active in Germany, Hungary, and China, and delivers to 48 countries around the world.

MCD Elektronik GmbH manufactures measurement and test systems for electronic production for their customers, who include OEMs and their suppliers in the automotive sector, companies in machine and systems design, medical technology, energy-electronics, quality technology, sensor manufacturing, and aerospace. The company relies on innovative customer-specific complete solutions - developed and realized by a team of highly qualified specialists.

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