measX
Measurement System Experts

„The new test bench has made our production even more efficient. Thanks to measX software, we can intuitively implement measurement procedures."

Michael Brandl,
Global Process Engineering, Test & Measurement,
Rosenberger Hochfrequenztechnik GmbH & Co. KG

Project Profile

Customer:	Rosenberger Hochfrequenz-technik GmbH & Co. KG
Industry:	High-frequency, fiber-optic, and high-voltage connection solutions
Project:	High-frequency measurements with robots and vector network analyzer (VNA)
Task:	Upgrade of the test bench software
Solution:	Central organization and automatic sequencing, device manager for VNAs with calibra-tion routine, high-frequency analysis, database coupling, multilingual interface
Software:	Based on LabVIEW
Hardware:	Measurement hardware Anritsu ShockLine MS46522B, Anritsu VectorStar MS4647B
Key figures:	7 test benches, daily testing of more than 500 modules with hundreds of contacts, testing of a contact in just a few seconds

Precision for High Frequency

Rosenberger Hochfrequenztechnik – Measurement Robot for Wire Modules

Data Management and Automation Enable Full Transparency

The Initial Situation

Rosenberger Hochfrequenztechnik, with its headquarters in Fridolfing, Upper Bavaria, is a member of the Rosenberger Group and a leading international manufacturer of connection solutions. One area of focus is customer-specific high-frequency solutions for high-tech companies in a diverse range of industries.

Rosenberger pursues a zero-error strategy: All wires and wire modules are laboriously tested at the end of production. The complex measurements take place in manual test facilities and on test benches equipped with measurement robots. Automated testing is implemented in particular for modules with hundreds of contacts. Two robot arms contact all wire or contact pairs of the test piece, measure them using a vector network analyzer (VNA) and verify the results against customer specifications.
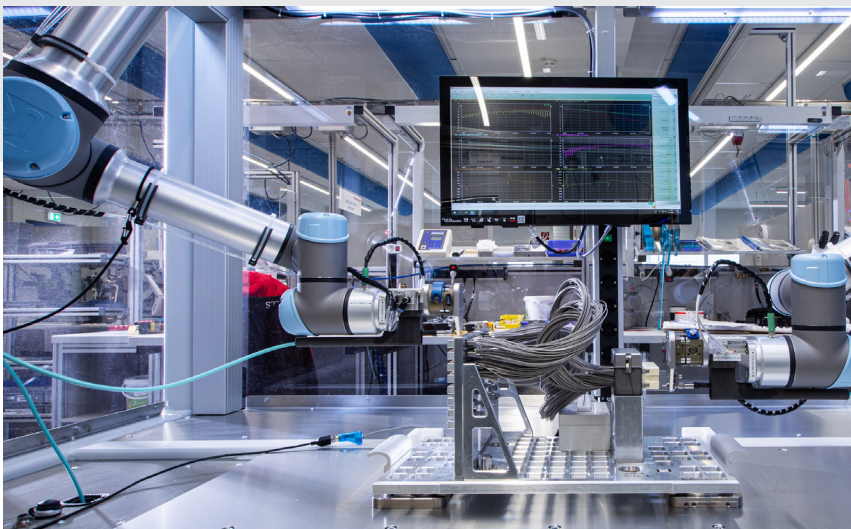
The Task

To meet the rising demand for testing, Rosenberger needed a new high-frequency measurement robot (HFR). The test bench software needed to work with a database and c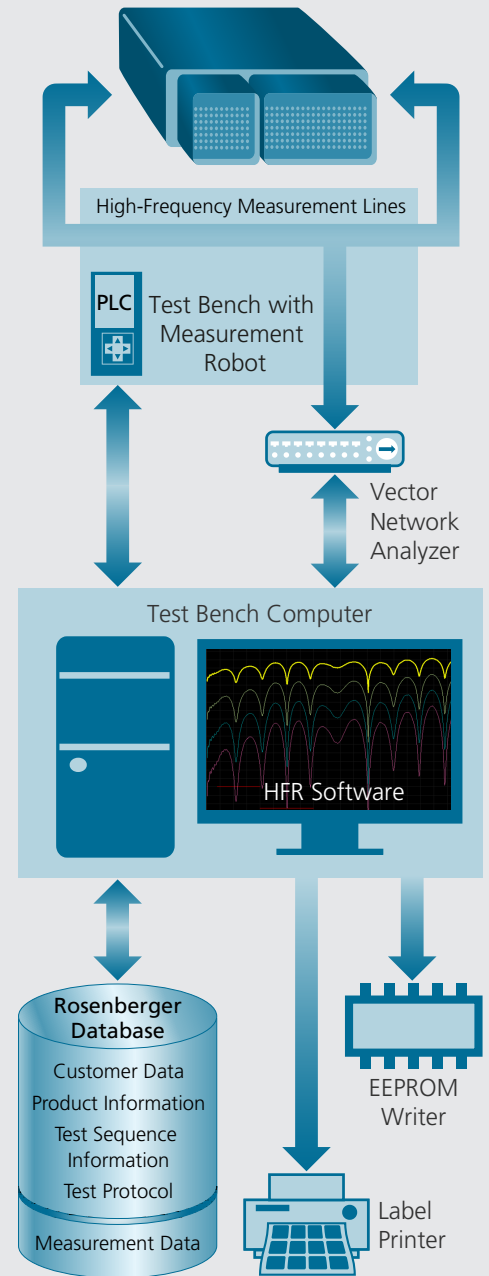entrally control the test sequence. Significant differences in the measurement instruments, test procedures, and protocols depending on the customer and test piece had to be taken into consideration. Rosenberger chose measX as its solution partner. Rosenberger was extremely satisfied with the measurement data management (MDM) system that measX had developed for other test pieces. This collaboration has been successfully ongoing for a number of years.

The Solution

Rosenberger and measX worked together to develop the new HFR test bench. Rosenberger handled the hardware and the measurement robot with Siemens PLC, while measX was responsible for the test bench software. The MDM software, which is already in use, brought with it a host of functions, such as control of the VNAs, making it a logical choice as the basis for the HFR software. Extending the MDM software to integrate the measurement robot posed no difficulties thanks to the consistently modular design.

High-Frequency Measurement Lines

PLC — Test Bench with Measurement Robot

Vector Network Analyzer

Test Bench Computer

HFR Software

Rosenberger Database
Customer Data
Product Information
Test Sequence Information
Test Protocol
Measurement Data

EEPROM Writer

Label Printer

High-tech test with robotics: Two robot arms bring the measurement tips precisely into position.

Main benefits of the upgrade:
- *x* Central data storage
- *x* Error minimization
- *x* Precise tracking capability
- *x* Maximum flexibility

Central Data Platform

A core feature of the HFR software is that all customer- and product-related data is collected together at one point and the entire test process is centrally organized, controlled, and monitored from here – from creation of the test configuration to control of the PLC and VNA and logging of the measurement results.

Test Order as Central Element

The test order defines the entire test sequence. It contains roughly 60 parameters, from general information about the order and the design of the test piece to the measurement configuration for the specific VNA used. How many contacts need to be approached and in which frequency range should the measurement take place? What are the limit values? What information need to be written on the test label or EEPROM?

The HFR software enables an automated workflow with minimal manual interventions. Extensive information is imported directly from the Rosenberger database. The finished test configuration is compiled together in an order file that controls the entire sequence.

Automatic Sequence Control

At the start of the test, the operating personnel fixes the test piece in place and positions it precisely within the workspace. The test order is automatically loaded by entering the order number on the keyboard or via QR code.

When the test is started, the HFR software begins communicating with the PLC. This controls the movements of the robotic arms, approaching of the respective coordinates, and contacting of the measurement tips. The software sends the contact numbers of the contact pair to be measured to the PLC and starts the measurement run once the controller reports successful contacting. All contacts are approached in sequence and measured with high precision according to the respective VNA configuration.

From Signal to Measurement Report

The HFR software collects the measurement values, evaluates them according to the stored limit values, and visualizes the result in high-frequency-specific graphs. Contacts that lie outside of the specified limits can be remeasured for verification. If the test piece is ultimately determined to be out of specification, it is not released and must be reworked. In the end, the test piece is assigned a unique serial number and a matching label as well as a customer-specific EEPROM if necessary. At the same time, the HFR software saves the measurement data and test results along with all information on the test order in the Rosenberger database. The measurement data is also available to the customer on request.

Flexible Integration of Measurement Instruments

One particular strength of the system is the device manager with plug-ins for controlling a variety of VNAs from any manufacturer. When a new test order is "accepted" by the software, the matching device configuration for the measurement is automatically directly available. New device plug-ins can be added at any time without the need to change the HFR software.
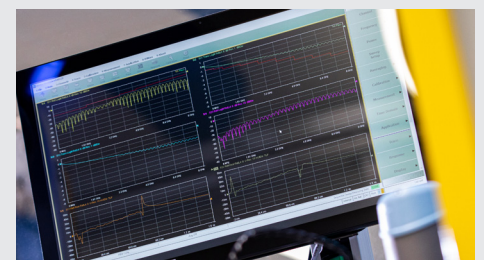
Clear presentation of the measurement results directly at the test bench.
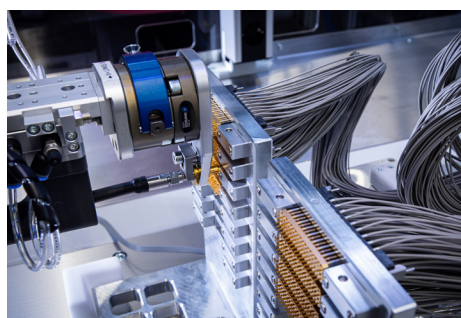
All contacts are approached and measured automatically.

Infinitely flexible testing:
- *x* Test pieces
- *x* Measurement and testing tasks
- *x* Measurement instruments
- *x* Robot and PLC
- *x* Other functions

In Practical Use

The software upgrade significantly improved the measuring robot test bench for signal modules. One major advantage is the end-to-end measurement data management with direct integration into the Rosenberger database. All data and information to be utilized are maintained centrally here and automatically imported. The test results are then stored here as well.
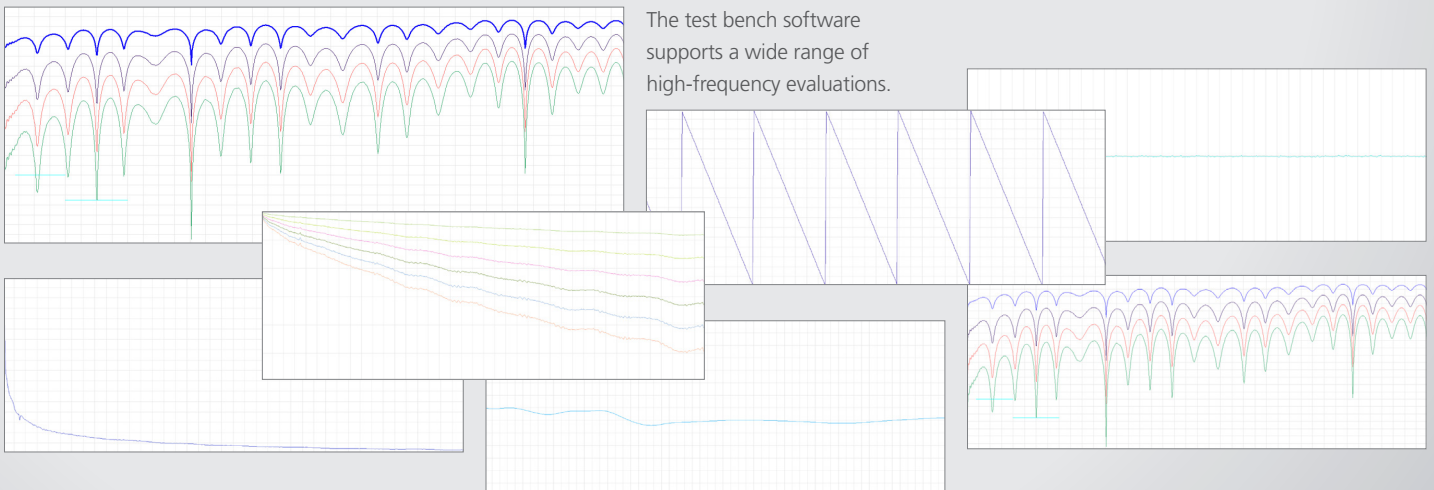
This allows Rosenberger to reliably avoid input and transfer errors. Furthermore, the multi-level authorization concept ensures secure handling of the test process and results.

Maximum Traceability and Flexibility

The new generation of the HFR test bench offers complete transparency: Every test can be traced and checked at any time down to the level of the measurement values. The fact that both end customers and Rosenberger see the same central data source facilitates collaboration – in the development of product specifications and even in case of complaints.

The company is well equipped for future tasks: New measurement and testing requirements can be easily implemented at any time, even for individual pieces.

The customers and Rosenberger are already benefiting from the flexibility of the system, as they can use the VNA that is best suited for the respective testing task from both a technical and economic perspective. Plus, it is easy to integrate additional functions. For example, a feature has recently been added in which the measurement robot removes the contacts identified as erroneous, thereby supporting the repair process. Seven of the new HFR test benches are already in successful use at production sites in Germany and Hungary. In the future, the automated high-frequency tests will take place using only the new system.

The test bench software supports a wide range of high-frequency evaluations.