

# TSEP

**The Best Soft- and Hardware  
for Your T&M-Projects.**

*You are engineering the future.*

*We support you.*



# This is TSEP

*This is us. This is what we do.*

*As a team and for over 30 years now*

For over 30 years, TSEP has been developing test- & measurement software and hardware for its own or customer specific products and covers the fields of production, automation, test and measurement, and automotive. We do not only support our customers in the creation of their software components, we also support our customers in the design and implementation of these components. A large part of our work has always consisted of developing hardware-related, time-critical or complex software components. It was therefore natural to develop drivers for different operating systems or to support our customers in their design phases. Real-time requirements are not uncommon in our working field, so developing for real-time operating systems is a common task for us.

Due to the development of hardware-related software, it was logical for us to develop hardware as well. Our customers see it as a great advantage of TSEP to obtain software and hardware from a single source. That's why we started developing our own hardware 15 years ago. In recent years, not only hardware has been developed that we're using in customer devices, we have also developed our own hardware and device that were successfully used by our customers.





## What We Do.

*TSEP offers you everything you need from hardware products to services and consulting.*

As an IT company, we focus on engineering the future. That's why we specialized in services and products that help making T&M better. As a result, you as a customer can be more efficient.

Have a look at Chronos, our time synchronization product. Without Chronos your timing would be more than 50 times less precise. That's why you have Chronos. Or do you?

In addition, we provide you with all-in-one-solutions when it comes to timing. For instance, our Themis rack supports you with all the basics you need to implement a system.

You have special tasks and need individual solutions? That's where we come from! Just talk to one of our developers, and we make whatever you need.

WE DEVELOP “  
HIGH QUALITY  
AND COMPLEX SOLUTIONS  
WHICH, AT THE SAME TIME,  
ARE EASY TO INTEGRATE

” IN EXISTING  
SYSTEMS.



# Hardware Development I

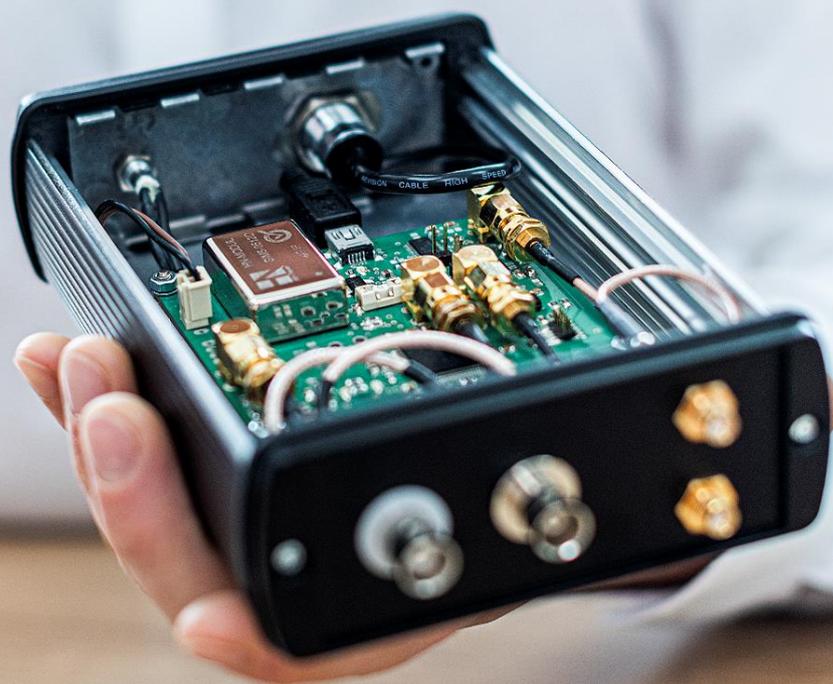
*We are developing your hardware, no matter if T&M hardware or test system...*

## **Test&Measurement Hardware**

TSEP has been developing measurement hardware in-house and for customers for years. This ranges from a small microcontrol-board that is used to record measurement data to a complex device (Kerberos, Step Attenuator) that has a complex functionality and consists of several components. TSEP develops these products completely in-house and has highly qualified partners in Germany for the manufacture of the products. TSEP also develops reference designs for its customers, which then are integrated into the customer-specific products in different forms.

## **Test Systems**

TSEP also creates complex test systems for its customers, in which component parameters are recorded using measurement technologies. Until 2019, these components were custom-made and 100% customized. In order to be able to offer solutions for customers even more efficiently and thus more cost-effectively, TSEP decided in 2019 to develop a modular system for such test systems, and the product Themis was born. Themis is a modular system for test systems in which customer-specific hardware with standard measurement technology (PXI cards) can be used. Themis will be available from the end of 2020 and will be delivered to customers in early 2021.



# Hardware Development II

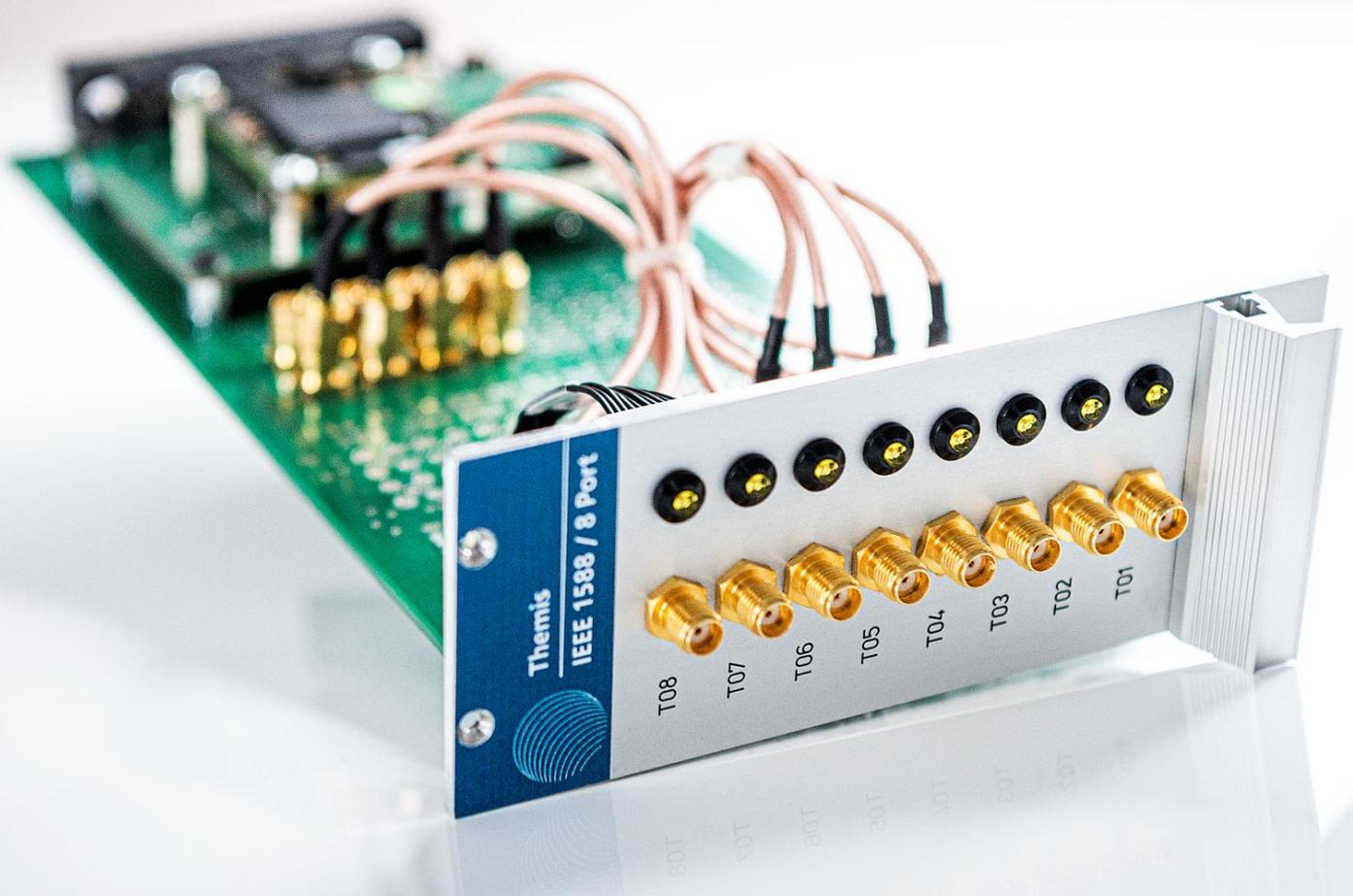
*...or if you need  $\mu$ Controller Development, or a Field Programmable Gate Array.*

## **$\mu$ Controller Development**

TSEP has been developing microcontrollers for a wide variety of tasks for 15 years. TSEP primarily relies on the Cypress PSoC microcontroller series, which are extremely scalable, have programmable hardware (analogous to an FPGA) and allow simple hardware switching to be carried out. In recent years, more and more Atmel microcontroller developments have been carried out at TSEP. In the last 10 years, a three-digit number of different projects have been implemented, from simple sensors to complex antenna controls (rotor).

## **FPGA**

FPGA developments have become more complex and simple solutions with microcontrollers were no longer possible. Upcoming TSEP product developments also made it necessary to focus more strongly in this direction. That is why TSEP 2020 has started to devote itself more and more to FPGA development. To this end, the development team has been strengthened accordingly. TSEP is busy with several in-house product developments, especially in the area of the Xilinx Zynq environment.



# Themis

*Our modular base platform for  
your test- and measurement systems.*

## Highlights



Available as 19"/3U rack, table-top or individual measurement device



Integration of PXI/PXIe measuring cards or individually developed measuring cards



Control of all sub-components of the test and measurement device via one interface



Connection via Ethernet or USB with using the SCPI 488.2 protocol



Software for implementing the test and measurement tasks



IEEE 1588 for time synchronisation of several test and measurement systems



IEEE 1588 support for time-controlled triggers and timestamping of measurement data

Today's test and measurement tasks are usually complex scenarios that cannot be reduced to a hardware or software solution. They are usually complex systems consisting of many individual components that have to be integrated into a complete system. Hereby, hardware components as well as software components must be integrated. Not all test and measurement tasks can be performed with standardized components, so additional individual hardware or software components must be developed and integrated into the system. Our vision was to develop a system for our customers that can implement their most diverse requirements. All integration problems should be completely encapsulated in this system, changes and extensions of the system should not change the existing infrastructure of the system. In addition, a standardized interface should be available for the customer to control the system. From this vision, our product Themis was born. By using both individual hardware and standardized PXI/PXIe components, we can now realize customized systems for our customers.



# Chronos

*Unmatched time-synchronization with our IEEE 1588-2019 PTP stack.*

## Highlights



Supports IEEE 1588-2008 and 1588-2019



Supports Intel i210/i211 and i350



Supports Windows, Linux and RTOS (IntervalZero / TenAsys)



OneStep and TwoStep synchronization



Supports Ordinary, Boundary and Transparent Clocks



Managing Node



User defined servo algorithm



Time-synchronous hardware trigger

Time-synchronous processes are an essential topic in all areas of industry, and especially in the areas of production, automation and measurement technology. The IEEE 1588 standard provides a protocol to synchronize the time understanding of different devices via an Ethernet network. Since the standard was published in 2002, it has been continuously developed. The TSEP product Chronos now also supports the new IEEE 1588-2019 standard from version 2.1 onwards. Chronos is available on various platforms (Windows / Linux / RTOSs) and supports Intel network chips (i210/i211 and i350). Chronos also contains numerous tools, such as the visualization of time jitter, synchronization of the system time or the control and configuration of the IEEE 1588 topology via management messages. With the Chronos 2.1 version, in particular, a novel application of virtual boundary clocks is possible, which means that heterogeneous systems with different transport channels can now be implemented.



# Kerberos 2.0

*Self-testing and -certification according to the LXI standard.*

## Highlights



All-In-One LXI  
Self-Certification Solution



Control and Visualization by Client



Regression test and  
developer support



Continuous Support and  
further development



IEEE 1588  
Verification Test

TSEP offers with its product Kerberos a hardware and software solution for the self-certification of measuring instruments for the core functionality of the LXI Standard. Additionally, with Kerberos it is also possible to self-certify the extended functions for support of IPv6, for the communication over VXI-11 or HiSLIP, and the IEEE 1588 functionality. The current Kerberos version has implemented the same test protocols as the current LXI Conformance test suite of the LXI consortium. But with the addition, that the test parameters in Kerberos are more restrictive such that the tests are executed more thoroughly. However, Kerberos offers a unique and holistic solution from hardware, software, and client for the execution, evaluation, and self-certification of LXI Conformance tests. Kerberos can also be used to validate existing compliant products in regression tests in addition to the conformance test.



# Poseidon

Your remote system with  
SCPI-499.2 Parser.

## Highlights



High-performance command execution and data transfer



Default data channels: TCP/IP, RS232 and HiSLIP (only for LXI members)



Multi-instance concept for parser and data channels



Generations of code skeletons and documentation with XML

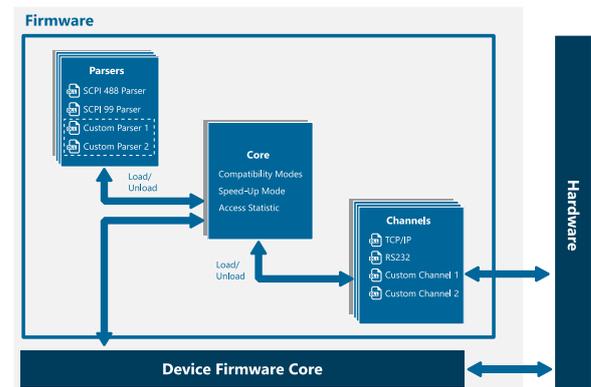


Innovative and efficient SCPI parameter architecture



Cross-platform compatible (Windows and Linux)

In today's test automation, there is a demand for fast command and query execution of measurement instruments. TSEP's Poseidon optimizes the measurement instrument's time-consuming process of communication with test system clients. The innovative design aims for the optimization of the command execution on all systematic levels. Optimization capabilities of the Poseidon are based on the tree-like data structure of the SCPI-commands and the prioritization of the SCPI-commands during the run time on grounds of an access statistic. Parallely, Poseidon provides an easy to integrate, flexible, and reliable framework. The generation, integration, and documentation of custom SCPI-commands and parsers can be done with an XML-generator.



WE SUPPORT “  
INNOVATORS  
” SINCE 1988.



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# IT-Consulting

*Find the support you want and need with our consulting services.*

## Project Management

TSEP has managed projects for itself and its customers for now over 25 years whether managing small projects with less than 10 developers or monitor large projects with over 50 developers. In recent years, TSEP has completely switched to agile project management (Scrum) and has convinced many customers of the efficiency of this approach. TSEP uses the Jira tool internally for control purposes, while the corresponding introduced tools (such as IBM RTC or similar) are used by customers.

## Evaluation of New Technologies

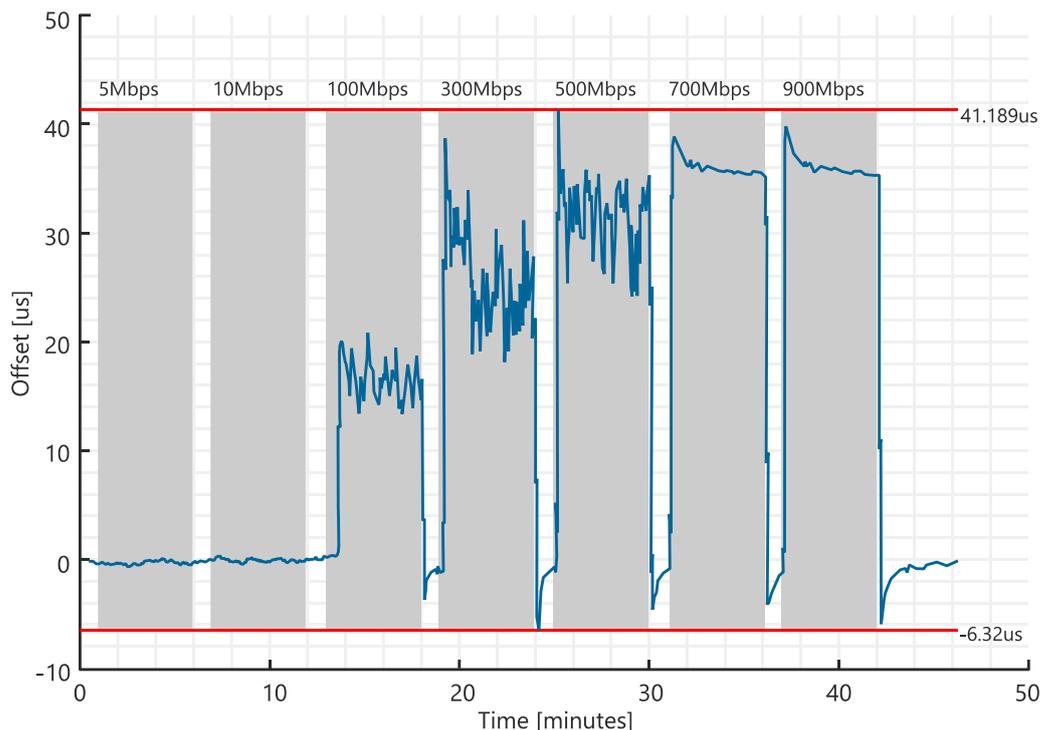
One of the biggest challenges within software and Test & Measurement is the development and evaluation of new or improved technologies. TSEP supports its customers in this process to include these technologies in their products. TSEP also creates the corresponding test implementation for evaluation and evaluates it in the customer environment.

## Requirement Analysis

One of the most difficult tasks in software development is defining the requirements for the develop product. TSEP advises and supports customers in finding the right and necessary requirements. TSEP benefits from its more than 30 years of experience in the creation of software and hardware. When analysing the requirements, TSEP relies on different methods and tools to determine these efficiently and target-oriented.

## Testing

Testing of hardware and software components has been an integral part of TSEP for now over 20 years. This procedure ensures a constant quality of the work and products at TSEP. For this purpose, various software was purchased from TSEP and developed in-house. This resulted in the TSEP being able to test quickly, cost-effectively and on time. Our customers were so convinced of this concept that the TSEP test division has been carrying out more and more tests on behalf of customers for years.



# Software Development

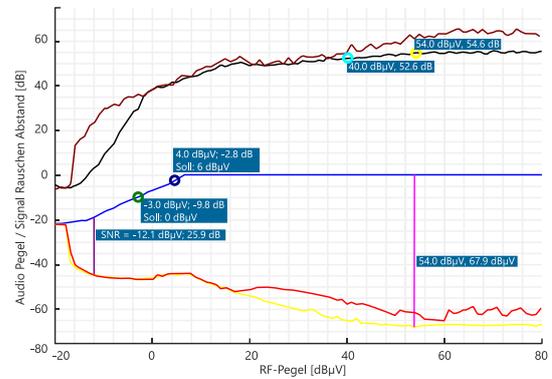
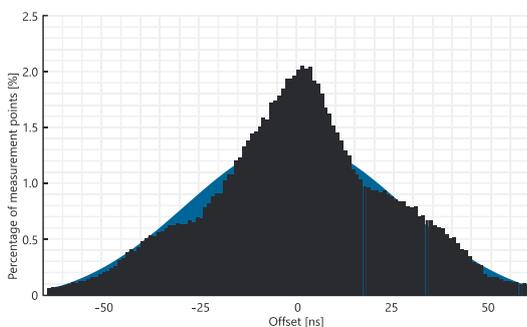
*T&M-software, real-time-software, driver-software, and many more - you name it, we develop it according to your requirements.*

## Test & Measurement Software

TSEP has been creating Test&Measurement software for itself and its customers for now over 20 years. TSEP has already created software for the complex visualization of measurement data, their recording and processing for its customers. The implementation of measurement processes such as calibration, implementation of measurement specifications or the development of corresponding measurement scenarios were also implemented for customers. The common programming environments (C++, C# or Python) or operating systems (Windows, Linux, and different Real-time OS) can be used for the developments.

## Real-Time Software

Under certain circumstances, measurement tasks must run within certain times or have to be started at certain times. The common Windows or Linux operating systems cannot be used or only to a very limited extent for such requirements. For such tasks, TSEP then uses different real-time operating systems that can be bought (Intime, IntervalZero, RTS Hypervisor, etc.) or some open source software. For simple applications on microcontrollers used by TSEP (Cypress), TSEP uses a self-developed OS.



## Driver Development

Due to the development of our own hardware, it was actually inevitable for TSEP to also create the corresponding drivers. Today, TSEP has several employees who can create kernel drivers for a wide variety of hardware. The developments range from simple USB drivers to highly complex PCIe drivers. New concepts for the drivers, such as user mode drivers or filter drivers, have also already been implemented at TSEP. In contrast to applications, software errors in drivers cannot be tolerated, which is why TSEP has created a QM specification specially tailored to driver development and applies it consistently.

## Porting of Software

Porting software is always a challenging task. Regardless of whether between operating systems or processor architectures. TSEP has performed successfully various projects for its customers here over the past 20 years. A special challenge for TSEP was large software packages from customers with several million lines of code (over 5 Million). For these porting's, TSEP has developed a strategy to carry out this work successfully, cost-effectively and within the time frame.

# Cooperation with TSEP

Using the inhouse expertise TSEP has built up a complex infrastructure regarding hardware (server, computer, measurement instruments) as well as software (security, version control, project management) to be a reliable and professional partner. An excellent connection to the Internet enables TSEP to exchange easily big data packages. TSEP works on the basis of work contracts at fixed price or with agile commission.

## Contact Details

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## About Us

Technical Software Engineering Plazotta GmbH

TSEP is a worldwide operating system house. For more than 30 years, we have successfully specialized in the development of system-related software and hardware in the fields of communications engineering, automotive, telecommunications, and measurement technology.

### TSEP

<https://tsep.com/en/about-us/company/>

