

Make a great leap forward!



Your high performance center for electronic components

Always a jump ahead!



HTV-group of companies: Your high performance center for electronic components

HTV was founded as a test-house in 1986 and established itself to the high performance center for electronic components.

As one of the worldwide market leaders, we stand for comprehensive technological competence at which customers can resort to decades of know how regarding testing including test-programme development, qualification as well as the programming of components with customer-software.

Pushing, developing and establishing the introduction of new innovative technologies is the motivation of the whole team.

The dynamics of the HTV-group of companies is reflected in innovative services, such as Long-Term Conservation of electronic components according to the worldwide unique TAB[®]-method, developed by us, as well as in a wide range of complex analytics procedures, with which the quality of electronic components can be examined. The reconditioning of oxidized and corroded components according to the HTV-revivec[®]-method, as the newest innovation, makes our service range perfect.

Welcome!

Testing of electronic components and ASIC-development

Testing and test-programme development are a central part of our service spectrum. Thus, parts we test are applied in the automobile, in telecommunication, aerospace, safety engineering and many other areas. The precise, manifold and, moreover, extremely specific test-procedures include environmental tests, parameter examinations and qualifications. Hence, possible error sources are detected relentlessly and the necessary test-depth is guaranteed. Furthermore, the existing intensive cooperation with many ASIC-producers and semiconductor manufacturers offers the possibility to order completely tested and packaged customer-specific components at HTV and thus, to obtain components immediately ready-to-use from one source.

Programming of electronic components

In one of the most efficient programming centers worldwide HTV provides the programming of electronic components as well as customer-specific packing and marking at the highest stage. As A-provider for the most automotive suppliers and automobile manufacturers worldwide all processes are adjusted to the corresponding standards and assure a processing of the components according to the 0-ppm goal.

Since 2008 **ertec GmbH**, manufacturing fully-automated programming-systems with the Huge Memory Flashing HMF[®] according to the smartJET Highspeed-technology[®] and highly innovative In-line programming-systems, is part of the HTV-group of companies. Based on this unique combination and synergy the exceptional advantage of a comprehensive range of services is offered to nearly all areas of the whole electronic branch.

Long-Term Conservation of electronic components

Worldwide unique is the conservation method for electronic components, the Thermal-Absorptive Gas-Conservation TAB[®], developed at HTV. This method reduces the decisive physical and chemical aging processes by a factor of 12–15 at present. Hence, the storage of electronic components of your last-buy, based on their initial state, is enabled currently up to 30 years! Thus, the quality, reliability as well as the processability of electronic components and complete assemblies is assured and announcements of component discontinuation and their deficient long-term availability lose their relevance as a highly explosive topic. Hence, you can adhere to your long-term delivery commitments also in the future and guarantee to your customers continuity over decades!

Analytics for electronic components

The analysis of electronic components on physical level becomes more and more important for the manufacturing and processing of components. On the one hand failures in production processes can be detected with the relevant analyses methods. On the other hand it is possible to undergo tests for components of uncertain origin procured due to lack of availability in order to assure the quality of the end product.

Packaging

A close cooperation between **MAF GmbH** in Frankfurt/Oder and HTV GmbH opens up a definitely improved possibility for packaging respectively housing of integrated circuits in the middle of Europe, opposite to Far Eastern suppliers. Direct, open ways of communication and contact persons, definite shorter processing times as well as a trouble-free logistics supply chain interconnect to a universal center of excellence on highest, certificated standard.



Programming of electronic components

The trend to always larger memories in programmable components still continues and will continue to intensify. Always longer and longer programming times as well as flash memories, becoming continuously cheaper in relation to mask-programmed components, increasingly induce companies to external programming of electronic components through a service provider. HTV recognized this trend in a very early stage and established one of the most productive programming centers worldwide. At present, the programming capacity amounts to several hundred thousand memories or controllers per day!



All about performances regarding the programming of electronic components

HTV recognized the trend for increasingly large memories in a very early stage and established one of the most efficient programming centers worldwide.

Process stability

Starting point of each programming process is the coordination of process parameters and the correct data with the customer. First of all release samples or series of initial specimen are manufactured. Afterwards, release of the programming process is performed by the customer. All workflows at programming and testing of series quantities are barcode controlled, so that a correct allocation of customer-software, components, machines and operators is always guaranteed and subsequently reproducible.

Development of adapters and algorithms

Short response times at implementation of new components take on greater significance. A special department at HTV is engaged with the development of algorithms and the construction of adapters. Thus, an adaption of new component types and package forms to the programming automats can be performed on short-term. Programming algorithms are self-developed, if required, whereby a fast delivery of samples and then the series is guaranteed.

NAND-Flashes

More and more powerful and comprehensive software requires also the use of larger and larger memory chips. NAND-Flashes are becoming increasingly the storage media of choice. At HTV very large memories are programmed based on the unique Huge Memory Flashing HMF[®] according to the SmartJET Highspeed-technology[®] of **ertec GmbH**, also belonging to the HTV-group of companies. Here, HTV offers special tailored and practicable solutions for the Bad-Block-Handling in close cooperation and coordination with the customer.

Serial numbers

Requirements regarding more and more complex serial numbers increase constantly. Here, HTV offers very flexible solutions, e.g. also for the programming of MAC-addresses. The used serial numbers are meticulously documented and, on demand, lasered on the component. Thus, the customer obtains a clear assignment to his end product.





At a glance:

Programming of microcontrollers, flash memories, EEPROMs, EPROMs, GALs, PALs, FPGAs, EPLDs, OTPs, etc.

Barcode controlled processes

Short-term delivery of sample components and series of initial samples

Delivery of small and large quantities in a few hours

Laser marking, labelling or colour dot

Programming of most complex serial numbers

Generating of programming algorithms for new components

Development of special adapters

Laser marking, also with time-stamp and machine assignment

Removal of original marking

Direct support by qualified engineers

Problem analysis on in-house high capacity test-systems

Wafer-programming

Subsequent to programming, marking and 3D-lead inspection, packing is optionally accomplished in trays, tubes or on tape

Laser marking

Subsequently, programmed components or parts otherwise processed obtain directly an inscription or marking via laser enabling e.g. the outer visualization of the programmed software version based on a works number. Via a time-stamp or the number of the used test-equipment the customer receives valuable tracking data allowing an exact traceability.

Removal of original marking

For the protection of corporate know how it is sometimes required to make the original manufacturers' marking of a component unrecognizable. With a special HTV-procedure not only the existing marking can be removed from the component, but also a customer-specific marking can be applied simultaneously in one work-step.

Fault analysis

Based on the know how and equipment coming from the test-area, occurring problems during the programming process can be directly analysed. Thereby we define, document and evaluate failure causes and provide you with a test-report with which you can take further steps.

Wafer-programming

Moreover, HTV develops also new concepts for programming. Hence, the programming of microcontrollers is carried out already on the wafer based on a self-developed procedure.

At present, the programming capacity adds up to several hundred thousand memories or controllers per day!





3D-lead inspection and tape&reel service

The steadily increasing requirements (0-ppm) regarding process stability make it indispensable that components adhere to mechanical dimensions according to their datasheet. Thus, it is of vital importance for a trouble-free subsequent processing (e.g. at soldering) of programmed components that the component pins are not damaged. Deformation of pins at contacting during the programming operation cannot be eliminated completely. Even on delivery a damage might already be present. All the more it is important to perform a subsequent 3D-lead inspection, at which all pins are measured via a camera-system.



3D-lead inspection and tape&reel service



Components possessing whiskers can automatically optically be inspected and sorted out on machines at HTV via a special method.

In contrast to the most inspection-systems, measuring is only two-dimensionally performed, the high-precision HTV-equipment works with a three-dimensional method recognizing all kinds of pin deformation and ensuring coplanarity. Besides, marking and positioning of the components is inspected via Automatic Optical Inspection (AOI). Hence, a trouble-free processing is ensured to the customer.

Whisker detection

Several times there was a change to pure tin surfaces within the context of RoHS requirements. However, these are, to some extent, problematic regarding the formation of whiskers. Whiskers are finest tin needles or tin crystals developing very fast due to material tensions and appropriate ambient conditions in case of pure tin surfaces. Based on their characteristics whiskers can cause short circuits between component pins. Thus, components can be damaged or failure malfunctions can be provoked. Components possessing whiskers can automatically optically be inspected and sorted out on machines at HTV via a special method.

Tape&reel service / Taping

Nowadays many SMD-assembly-lines use exclusively taped goods in order to save the valuable feeder position. Accordingly, the packing of most of the tested or programmed parts is performed again in a blister tape. Due to the enormous variety of diverse package types a very well-assorted warehouse of raw tapes is present at HTV, so that an appropriate tape is generally always available. Hence, customers are served fast and receive their components appropriately tailored for the further processing. Even for special components a solution can be found based on the development of specific tapes. Taping is usually performed fully-automatic in one work step, directly after 3D-lead inspection. Herewith it is assured that the goods are safely packed directly after inspection.



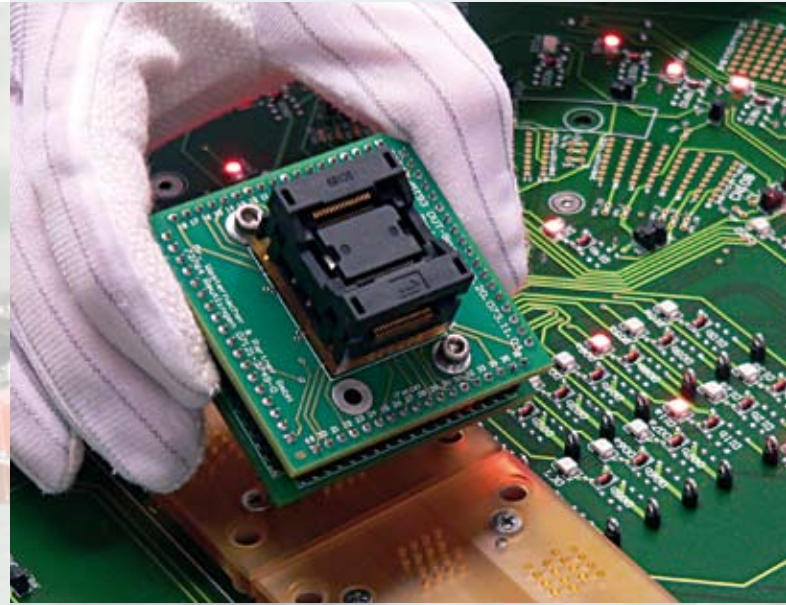
At a glance:

- Fully-automated 3D-lead inspection**
- Mark inspection and Pin1-inspection**
- Examination of all packaging types (including BGAs and QFN)**
- Whisker detection and screening**
- Fully-automated and manual tape&reel service (e.g. for special components)**
- Development regarding customer-specific tape&reel requirements**
- Tape&reel service for dies**



Testing of electronic components

Testing is a central element and one of the core competences of our service spectrum. Thus, tested parts of HTV are applied in the automotive industry, in telecommunications, the consumer market, in the aerospace industry and many other areas. For tests a huge and very well-assorted machine park is available. That requires, among others, fully-automated high capacity testers of most different manufacturers as well as self-developed systems with which highly precise measurements on most complex electronic circuits at diverse ambient temperatures can be performed. The required test-programmes for the most different measurements are developed by HTV-specialists and precisely tailored to specific customer-needs. Hence, customized solutions for component problems are extremely fast and competently elaborated.



All about performances regarding testing of electronic devices



Testing is a central element and one of the core competences of our service spectrum.

Component qualification and environmental simulation

Especially in the case of safety-relevant use or automotive use it is essential to undergo a qualification prior to the final series application of the component. In case of a qualification, after a recorded parameter measurement of new parts, additional components have to undergo various procedures (Burn-In, temperature-variations in stress, Pressure-Cooker-tests or similar). During these procedures intermediate measurements and – subsequent to their completion – a final measurement takes place. Occurring deviations are afterwards recorded and evaluated. Furthermore, stress-tests and life-cycle examinations can complete the qualification.



Test of series quantities

For the test of series quantities HTV has the most different component handling-systems, freely temperature-adjustable, on hand. The cooling of components down to -70°C is performed with liquid nitrogen fed from several big tanks via a vacuum conduction-system to the test-handlers. At smaller quantities the adjustment of the ambient temperature is performed via Thermostreams, bringing the component to be tested within seconds to the required temperature, using dehydrated air.



Why performing component testing?

- Inspection of datasheet values in case of uncertain origin**
- Prevention of early failures based on pre-aging**
- Examination of climatic consistency**
- Qualification of automotive applications**
- Screening of components regarding diverse electrical parameters**
- Function-test in case of safety-relevant applications**



Incoming inspection of goods

Customers also make use of the know how of HTV regarding outsourced incoming inspections. In this connection, components and also wafers are controlled regarding the adherence to datasheet values. During this process our engineers examine all parameters, defined with a threshold, on intelligent test-systems. In general it is deemed for test-systems that the test-depth decreases the more universal a system is. Hence, we, as a test-house, have a considerable equipment pool with a great number of specific test-systems in order to guarantee the necessary test-depth. Incoming inspections of goods can be performed based on customer-specific requirements and do not only consider electrical but also mechanical characteristics (physical dimensions, structures) on demand as well as the outer general condition of the components. Thus, the customer obtains a highly qualified statement regarding the condition of the delivered goods.



Wafer-test

Several handling-systems and contacting-systems enable the test of components still located on wafers, also under temperature-pressurization. As a result the defective components are thereby either marked or a wafer mapping in electronic form is compiled in order to enable a subsequent separation of failure parts.



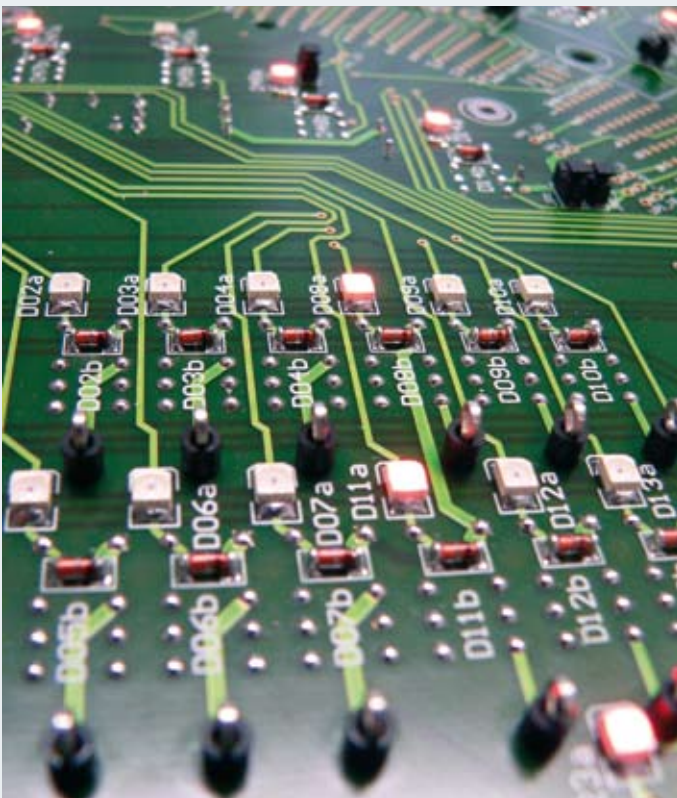
Thus, the customer obtains a highly qualified statement regarding the condition of the delivered goods.

ESD-test

The insensitivity of electronic components with respect to electrostatic charges is controlled via a huge number of instruments by exposing the components to defined charges on very high voltages. Adequate qualified parts are applied in areas in which specific risks appear based on outside influences and high electrical field stresses.

Fault analyses

If malfunctions at components occur in practice, HTV can exactly analyse and document deviations to the datasheet or malfunctions. Initial point therefore is the simulation of the operation environment of the components in terms of electrical parameters, such as loads or influences like temperature. Occurring failures can be allocated to physical weak points or design failures based on appropriate analysis in the next step.



At a glance:

- Datasheet-test at various ambient temperatures
- Screening of specific component parameters
- Qualification (e.g. according to AEC-Q)
- Wafer-test
- Photometric measurements
- Functional test of safety-relevant applications
- Environmental testing (e.g. Climate test)
- Burn-In
- High-temperature storage up to 250°C
- Temperature-cycles of -70°C up to +250°C
- Temperature shock
- Pressure-Cooker-test
- Incoming inspection of discrete, linear and digital components as well as of memories and microcontrollers
- Leakage-test
- ESD-test
- Compiling of error listings, failure statistics

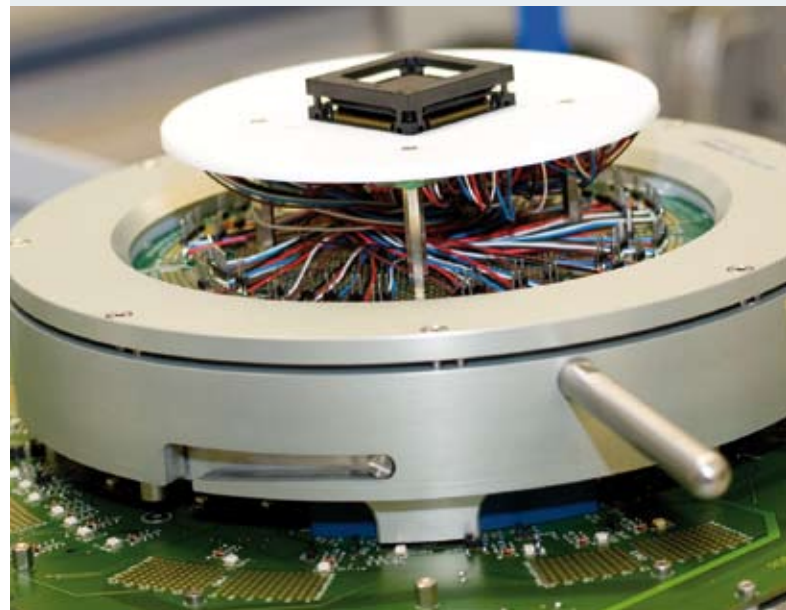


Test-programme development, ASIC-development and packaging

Customer-specific components become more and more a special subject of the European electronic industry. Thus, a specific know how, especially in the field of silicon sensor technology has to be involved. HTV cooperates closely with many European semiconductor manufacturers and ASIC-producers and provides a comprehensive special knowledge with its team of highly qualified engineers, who already extensively support the customer in the development phase of a component based on specific and specially-tailored test-software. Thus, problems regarding initial samples are detected at the earliest possible stage and corresponding changes during the next design-step are considered. Then test and screening of complete wafers are performed on high-precision HTV-capacity test-systems in series quantities.



Your partner for test-programme development, ASIC-development and packaging



Therefore, the customer obtains a comprehensive service with only one business partner.

From the wafer to the completely housed and tested component

Via the close cooperation with **MAF GmbH**, who has specialized in the packaging of electronic components, it is possible for us to offer to our customers also the packaging of components already tested on wafer-level. Based on the central location in Frankfurt/Oder packaged sample components and subsequently also series parts, opposite to service providers for packaging from Far East, are deliverable immediately.

These components undergo a final test at HTV according to the specified operation temperature-ranges and requirements. In this connection, our broad, manifold and most specific test-procedures detect possible failures relentlessly and guarantee the required level of test-depth. A huge number of handling-systems is available for the adaption of components to high capacity testers enabling also tests with extended temperature-ranges at large numbers of several hundred thousand parts per day. Therefore, the customer obtains a comprehensive service with only one business partner who provides support through all steps of his ASIC-development right up to the test of series quantities.

Development of test-programmes as a service

High-Performance-Test-System software and the necessary hardware adaptations, developed by HTV, come also into operation at in-house test-systems of semiconductor manufacturers. Hence, special know how is made available to the customer, so that he can implement the test in his entire production process and quality control cycle.



At a glance:

Wafer-test

Wafer-sawing

Manufacturing of samples in ceramic packages

Premold packages

Chips in wafer-pack

Packaging of series quantities

Development of specific test-software

Fully-automated tests of series quantities



Long-Term Conservation

Long before there was a market demand regarding the solution for long-term storage of electronic components, HTV analysed aging processes of electronic components and developed concepts for its prevention in close cooperation with universities. That is why HTV is the high performance center for conservation and storage of electronic components and assemblies.

Formation of hazardous substances and oxidation, internal and external diffusion processes as well as whisker growth, losses of data and capacity are the effects influencing directly availability and life-cycle of electronic parts and components.

However, these effects can sustainably be reduced based on appropriate concepts and procedures.



HTV-Conservation GmbH – Long-Term Conservation of electronic components



In close cooperation with universities HTV analysed aging processes of electronic components and developed concepts for its prevention.

Thermal-Absorptive Gas-Conservation TAB®

The specific conservation method **TAB®**, developed by HTV, reduces the decisive physical and chemical aging processes of components by a factor of 12 – 15 at present. This **worldwide unique** conservation procedure prevents reliably and sustainably from formation and progression of processes based on oxidation, corrosion and diffusion. Hence, quality, processability, availability and reliability of electronic components are currently assured up to 30 years. The present research works enable storage periods of 40 to 50 years in the future based on further optimization and new approaches to solution, as already required by specific branches of industry.

Processes of oxidation and diffusion

Decisive aging mechanisms are diffusion processes. In this respect, copper atoms of the substrate move to the tin coating, reach the surface and vice versa. The high oxidation susceptibility of the applied substrates cause an extremely fast and resistant oxidation. That implies, in consequence, that the parts cannot be processed anymore. However, comparable processes occur inside the parts as well, i.e. on the chip. Considering the physico-chemical structure, the single atoms in the chip are partly delocalized. They expand inside energy bands based on increasing potential depth and tunnel between the neighboring potential cavities, similar to electrons inside semiconductors. Based on the associated mixing, the reliability of electronic components is significantly reduced within the scope of a long-term storage, unless special precautionary measures are made.

Moisture and hazardous substances

Oxidation processes motivated through moisture and hazardous substances can cause, for example, the disintegration of conducting paths and isolation layers on long-term. The absorption process defined for the **TAB®**-procedure prevents reliably and sustainably from formation and progression of oxidation processes and corrosion processes. Additionally, hazardous substances, generated material-dependently, are absorbed.

Nitrogen packing

The choice of the appropriate storage method of electronic components and assemblies is considerably dependent on the planned storage period. Storages of one or two years can be performed in so-called Nitrogen-Dry-Packs. For this purpose, the components are packed in special bags together with desiccants and moisture indicators, then they are flushed with nitrogen and vacuumized afterwards, so that no oxygen molecules causing the oxidation, are located in the bag after welding. A storage in nitrogen cabinets is also possible for the above mentioned period.

For processing-relevant and safety-related reasons it is strongly advised against a pure nitrogen storage of more than three years!

Therefore the only possibility is the **HTV-Long-Term Conservation** according to the **TAB®**-method in order to retard the aging processes of the components significantly and to assure the function and processability over a long time!

At a glance:

Specific conservation of electronic parts and components according to the TAB®-method

Reduction of aging processes by a factor of 12–15; hence, storage periods of 30 years are possible at present

Comprehensive, continuous evaluation and monitoring of goods

Nitrogen-Dry-Packs for short storage periods



Analytics for electronic components

Analysis of electronic components becomes more and more major important for component manufacturing and component processing. Corresponding tests are essential for instance in case of quality problems (detection of failure mechanisms) and production defects or are applied for the determination of the component condition in order to localize failure causes respectively to evaluate failure potentials.

On the basis of examination results of the **HTV-analytics laboratory** and its detailed documentation a causal clarification for the case of application is immediately possible.



HTV-Conservation GmbH – Analytics for electronic components



Based on this unique know how, existing in our laboratories, the solderability, particularly of older components, can be revived.

Detailed examination results

Specific analysis procedures are necessary in order to assure the quality of the final product, particularly with regard to products of uncertain origin.

Besides the evaluation of the visual condition of goods detailed examinations via light microscopy, X-ray technology, scanning electron microscopy or sample preparations and microsections are performed providing information about the present condition of the components. Thus, a statement regarding the duration of a reliable processability of the components is enabled. For the evaluation of an intermetallic phase growth a SEM-analysis (scanning electron microscopy) is performed recording specifically its gradient and strength.

Two new analysis methods broaden the range of the HTV-analysis spectrum: on the one hand the **ion etching** which, as an alternative to the wet chemical etching, offers the possibility to structurally etch mechanically pre-built polished surfaces based on a gas bombardment with targeted accelerated particles and, thus, to obtain a smooth polished surface, complying to highest demands. An example for that are interferences on surfaces of nickel-/gold-PCBs, partly resulting in solderability failures, yet inconspicuously at visual inspection.

During use of electronic components, mainly under thermal exposure, the soldered junctions show only a low reliability. Such soldering junctions possess dark staining in the area of intermetallic phases and are also called „black pad“. This effect can definitely be proven via the microstructural ion etching.

As a further innovative technology on the other hand we have to mention the **Electron-Backscatter-Diffraction analysis (EBSD)**. This examination method for the determination of crystallographic orientation in crystals at the object surface is becoming more and more important and offers, just within the scope of a Long-Term Conservation, security to the highest degree. EBSD-analytics serves the needs for evaluation and protection of a stable component quality on long-term and for the optimization of decisive conservation parameters.

Reconditioning of components

The **HTV-revivec®**-method, especially developed for electronic components, enables the removal of organic and inorganic effects in form of oxide layers, corrosive areas and diverse impurities at component pins.

Based on this unique know how, existing in our laboratories, the solderability, particularly of older components, can be revived.

At a glance:

Light microscopy

Microsections

Component opening

Scanning Electron Microscopy (SEM)

Energy-dispersive X-ray spectroscopy (EDX)

Electron-Backscatter-Diffraction analysis (EBSD)

Fourier-Transform-Infrared spectroscopy (FTIR)

X-ray inspection

Fully-automated solderability-tests

Ion etching

Cleaning and reconditioning of electronic components according to the HTV-revivec®-method

Our performances:

Programming of electronic devices

Testing of electronic devices and components

Environmental tests (climatic stress-test, thermal shock-test, HAST-test, ...)

Test-programme development and development of ASICs

3D-lead inspection and tape&reel service

Packaging/die cast housing of dies

Long-Term Conservation of electronic components,
currently up to 30 years: **HTV-TAB**[®]-method

Analysis of electronic components (SEM, X-ray, microsections,
ion etching, ...)

Cleaning and reconditioning of electronic components:
HTV-revivec[®]-method



Always a jump ahead!