FEINHÜTTE HALSBRÜCKE

EMIL OTTO

EXCELLENT PRODUCTS

FOR YOUR ELECTRONICS PRODUCTION

COOPERATION
OF TWO FIRST CLASS
TRADITIONAL COMPANIES

Welcome!

The cooperation of Feinhütte Halsbrücke and Emil Otto combines two traditional companies, that are both market leaders in their respective specialist fields.

As Germany‘s most sophisticated tin- and lead smelter, Feinhütte Halsbrücke stands for metallurgical experience and quality like no other manufacturer.

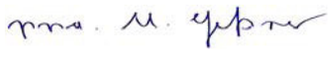
In the chemical sector Emil Otto is well known for excellent fluxing agents and a high standard of customer orientation.

The synergy of metallurgy and chemistry enables you to obtain comprehensive consultation and to procure all products for your applications from a single source. As an owner-managed family business, we share the same values and objectives. For us, the economical independence and the medium-sized flexibility is the cornerstone of our reliable and innovation-characterized work.

Be convinced by our products, our centuries of experience and our customer service.

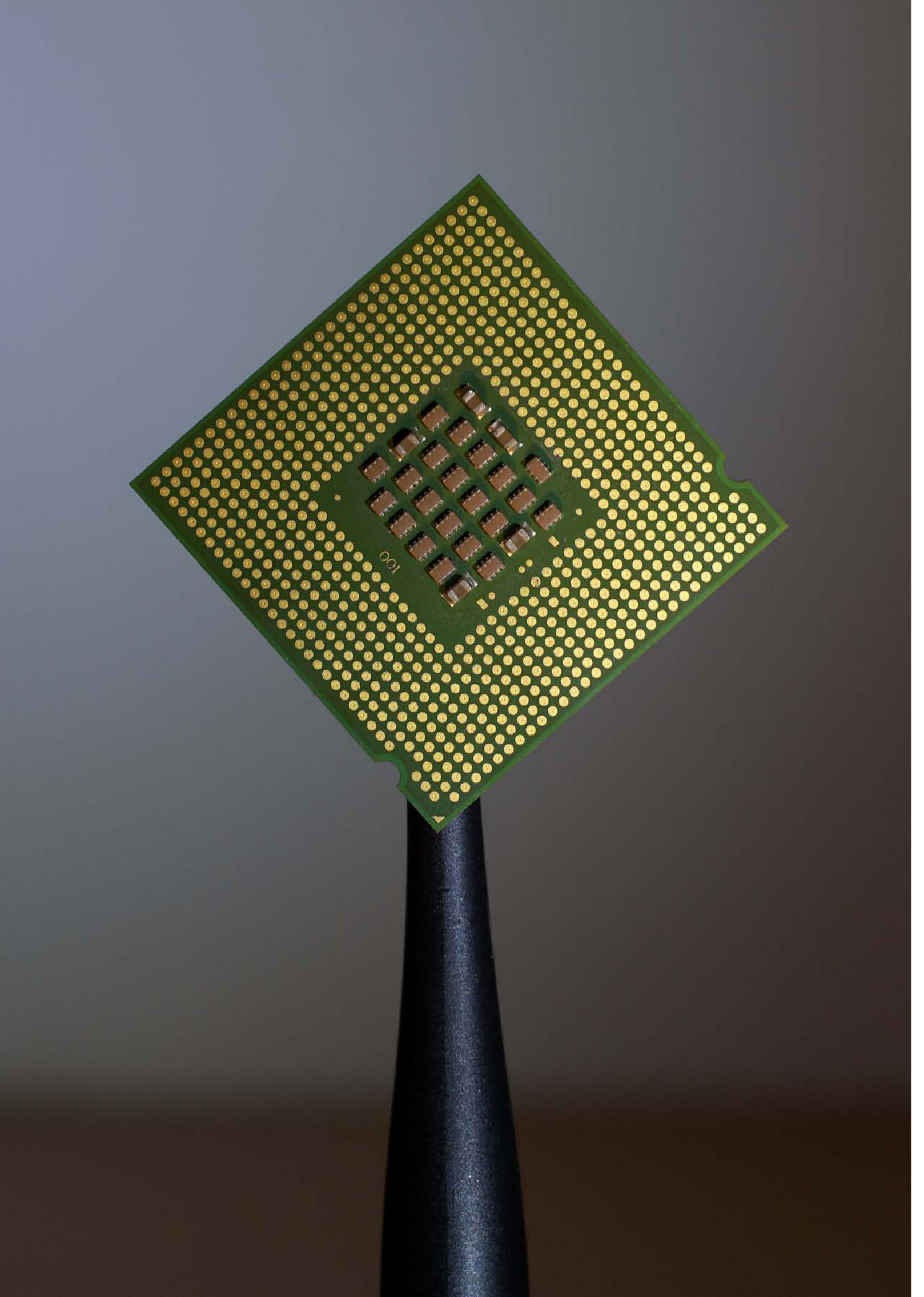
Lothar Patzig

CE
Feinhütte Halsbrücke GmbH



Markus Geßner

Prokurist
Emil Otto GmbH



OVERVIEW

FEINHÜTTE HALSBRÜCKE GMBH

EMIL OTTO FLUX- UND OBERFLÄCHENTECHNIK GMBH

SUSTAINABILITY
GOOD RESULT FOR THE ENVIRONMENT. AND FOR YOU.

Recycling with a great deal of responsibility has been a topic for us for centuries. We have already been supporting our customers in the proper and environmentally compatible disposal of their waste materials for a long time.

As a result, in times of increasing demand for raw materials, scarce resources and ever stricter environmental requirements, we point the way.

The list of input materials that we are able to feed back into the raw material cycle due to an almost residue-free complete recycling process, grows constantly.

That is good for the environment, economically wise, and expands product life cycles.

As a German tin- and lead smelter, for

SOLDER MANUFACTURERS, DEALERS AND INDUSTRIAL CUSTOMERS

we therefore offer a complete and sustainable portfolio, from the product, via services, through to the recycling of the residues.

FULL RECYCLING OF TIN & LEAD BY GERMANY'S **TIN- & LEAD SMELTER.**

For us the modern material management is anything but a one-way street: environmentally compatible handling of residues or waste are linked inseparably with each other. Sustainable recycling circuits cannot function any other way.

The excellent reputation that we enjoy in this sector has been earned, among other things through many years of expertise in the recovery of old solder and the process waste of our customers.

For us sustainable recycling has priority. According to § 26 of the Law on Lifecycle Management, we must return hazardous waste originating from our products.

Your advantage: You are exempt from the burden of proof. With your scrap metal settlement you receive the corresponding transfer note, which at the same time serves as evidence. You can utilize this service from us at any time.
We provide the necessary containers free of charge.

You are not yet one of our customers?
We advise you comprehensively and without obligation.

COMPLIANCE
CONSULTATION & SERVICE

On the one hand valuable raw materials. On the other hand national and European legislation on disposal and recycling. As your experienced partner, we advise you in all matters concerning the „Recycling of your production waste“.

This involves more than 400 years of experience in metallurgy and a team of extremely innovative and experienced metallurgists and waste specialists. Rely on safe full recycling that deserves the name - at attractive conditions, that will also help you to decide.

Today we already process thousands of tons of residues containing tin and lead every year.

We offer you a first class compliance consultation and best possible compensation for your valuable residues – ultimately you have nothing to give away.

We thereby ensure, that you move constantly and at all times legally waterproof in the field of disposal and recycling.

With our work we guarantee you a legally compliant recycling of your material. Away from the bureaucratic jungle - with § 26 KrWG and our comprehensive service.

YOUR ADVANTAGES AT A GLANCE

- Over 400 years of experience in metallurgy as one of the oldest smelters in Europe
- Germany‘s only tin- and lead smelter with this level of sophistication in the pyro- and hydrometallurgical sector
- Transparent, attractive remuneration system for your materials
- Legally compliant disposal and recycling in Germany
- Minimization of the bureaucratic work
- Experienced metallurgists and innovative production processes
- Very competent and well trained employees
- Comprehensive and sound consultation on all relevant issues regarding disposal, recycling and compliance
- The complete package: Besides the purchase of residues, we also produce and supply new material for individual applications

OVER 400 YEARS FEINHÜTTE HALSBRÜCKE
GOOD DUE TO TRADITION. SINCE 1612.

One of the oldest company sites in the region.
Lived tradition. innovations and science.

With its history of over 400 years, the Feinhütte Halsbrücke characterizes our region like no other company.
At the same time we secure a percentage of Germany‘s raw material demand for the strategically important metals tin and lead.

LIVED TRADITION. UP UNTIL TODAY.

23. MAY 1612

Official authorization to construct a smelter.

1771

The Russian Tsar Peter the Great visited the mines in the Ore Mountains and in connection with this also the Halsbrücke smelter. However Halsbrücke is also an interesting destination for naturalists. Consequently, among others Alexander von Humboldt also visited the amalgamate works in 1797.

1791

A world premier.
Construction of the amalgamate works of the Halsbrücke smelter. It is regarded as the model establishment for the European drum amalgamation – a process according to Christlieb Ehregott Gellert, that, based on Halsbrücke, among other places, was also copied in Russia and America.

1815

The smelting technician, chemist and inventor Wilhelm August Lampadius installed the first gas-lighting establishment on the European continent. First in a kitchen of the Halsbrücke smelter – then several months later, also in the great Anquicksaal of the amalgamate works.

1889

The Hohe Esse is up. At a height of 140 meters, the highest chimney in the world at the time: the „Hohe Esse“. Altogether with its location, an elevation of over 500 meters above sea level is achieved for waste gases – which enormously supported the dispersion of pollutants out of the Muldental. Up until today the Feinhütte Halsbrücke is still responsible for the full functioning capability of the Hohe Esse.

1931

Halsbrücke started with the lead electrolysis, which is used as refining process until 1991. From 1937 ore is mined once again in the Freiberg gallery and processed in the Halsbrücke smelter.

1961

The Feinhütte is part of the new VEB Mining and Smelting Combine „Albert Funk“. For Halsbrücke, the founding of the combine is also regarded as a new orientation: primarily the smelter is now used for the extraction of noble metals and an expanded manufacture of noble metal- and lead products.

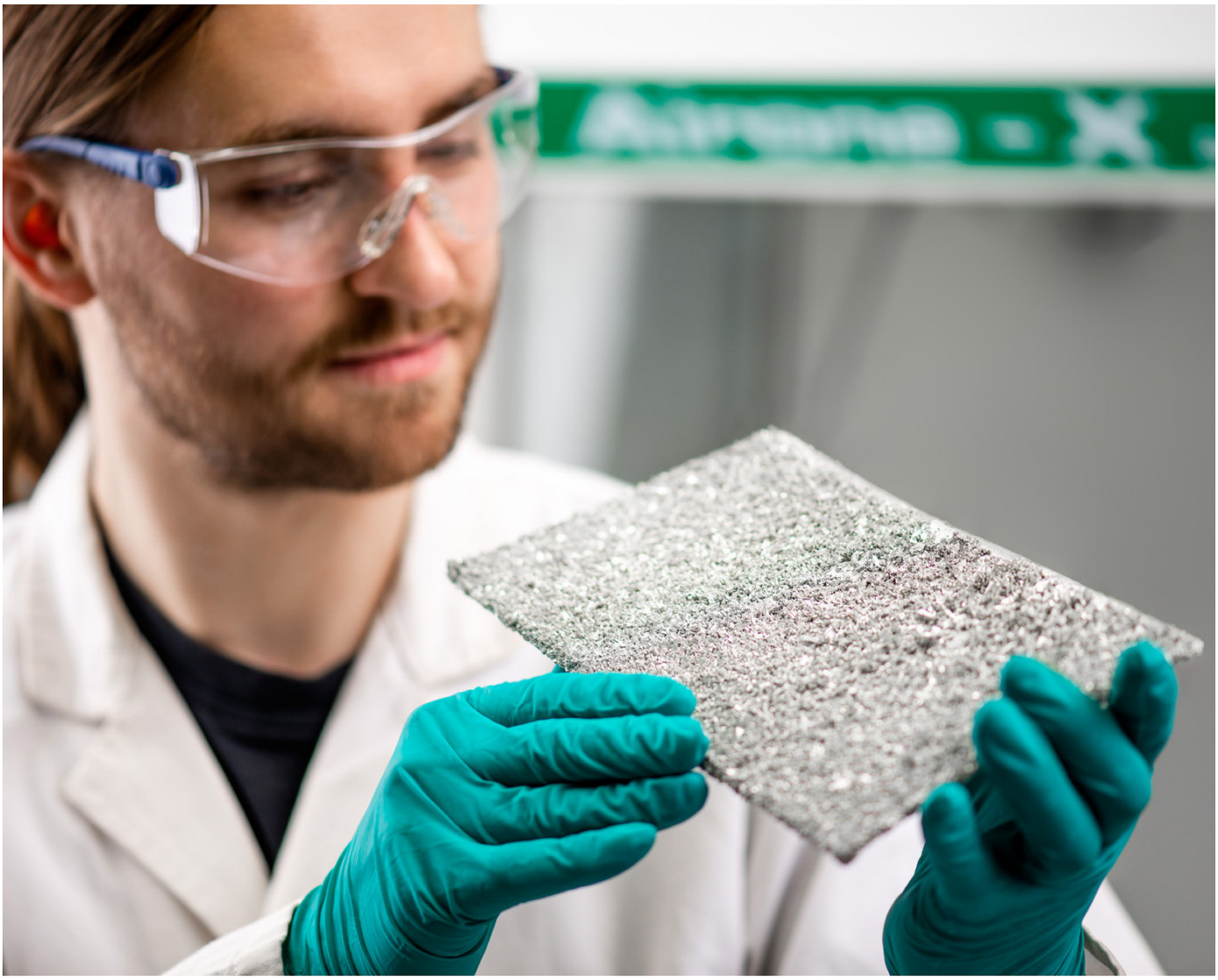
1992

The new start.
On the 7th August 1992 the new GmbH is founded.

2019

Pure progress.
Electrolysis reloaded: With the restructuring and optimization of the separate electrolysis, now an atomic purification is used, with which outstanding tin-lead alloys can be produced: Their degree of purity far surpasses that of common solder – accordingly, all companies with tin-lead applications are happy to use the new „Feinhütte Elyt“.

World Heritage Status
The mountain region Ore Mountains /Krušnohoří has been registered in the list of UNESCO World Heritage Sites.



FOR EXCELLENT PRODUCTS

The attribute „Fein“ in our company name has always described the core competence of our company:
The production of ultra pure metals and metal alloys - in a variety of formats.

However, our production itself is also influenced by environmental concerns. With investments in the double-digit million range, all processes have been continuously optimized. And every year more is invested in the company.

Today the Feinhütte Halsbrücke produces practically all tin and lead alloys. In almost unlimited variants and formats. And for customers of all industrial and commercial branches. The result: Metallurgical quality „Made in Halsbrücke“ is again an international synonym for top quality, individual solutions and innovations.

- MORE THAN 400 YEARS OF TRADITION
- 85 EMPLOYEES
- 45 MILLION EURO ANNUAL TURNOVER
- CUSTOMER RELATIONS IN OVER 30 COUNTRIES
- ON FOUR CONTINENTS
- 15,000 T ANNUAL PRODUCTION
- ISO 9001
- ISO 14001
- ISO 50001

METALS AND ALLOYS OF TOP QUALITY FOR THE ELECTRONICS PRODUCTION

Due to the rapid developments that have taken place for decades in the areas of power-, entertainment- and control electronics, the Electronic Manufacturing Services (EMS) has attained a worldwide key position. At the same time, due to the constantly advancing digitization and automation, EMS has practically assumed a more than central key role in the production in every area of life and economy.

EMS can be found practically in all areas of daily life, in products and services of modern society. While in the previous years the focus was on the substitution of alloys containing lead, and which have been largely successfully replaced by the soft solders standardized today, the ongoing development cycle is however nowhere near at an end.

INNOVATION AS INDICATOR

Nowadays the major part of the development work is to further optimize existing applications, in order to be able to utilize resources, energy and production capacities as best as possible – at all times with the superordinate objective, to take into account both the present and future high quality- and environmental standards to the highest extent.

A further fundamental component of this development is the systematic reduction of input materials that are harmful to the environment and health.

Presently there are a lot of very different EMS soft solders available for all common applications, which always more than meet the very high customer expectations in all requirement features. In order to satisfy these requirements to the fullest extent, for us it is a matter of course, that for the production of lead-free EMS soft solders, in general only metals with a minimum degree of purity of 99.9% are used.

The long term lived Supply-Chain-Management was and is the basis, in order to be able to generally and continuously satisfy our own and the customers‘ quality demands to the fullest extent.

The Feinhütte Halsbrücke GmbH offers you EMS soft solders both for standard temperature profiles as well as in the range of low- and high temperature soft solders, and thereby successfully serves the global needs of the following fields of application:

- PCB MANUFACTURING
- PCB PLACEMENT
- CABLE ASSEMBLY
- MEASURING DEVICE CONSTRUCTION
- MEDICAL TECHNOLOGY
- AUTOMOTIVE

ALL A QUESTION OF FORMAT.
ULTRAPURE. ECONOMICAL. EFFECTIVE.

We offer bar-, rod- as well as solid soft solders, process optimized for use in your wave-, selective- and hot air tinning systems. From starting solder of new systems to trailer solders of established aggregates through to special additive solders for dynamic readjustments, such as for example the reduction of the latent existing oxidation.

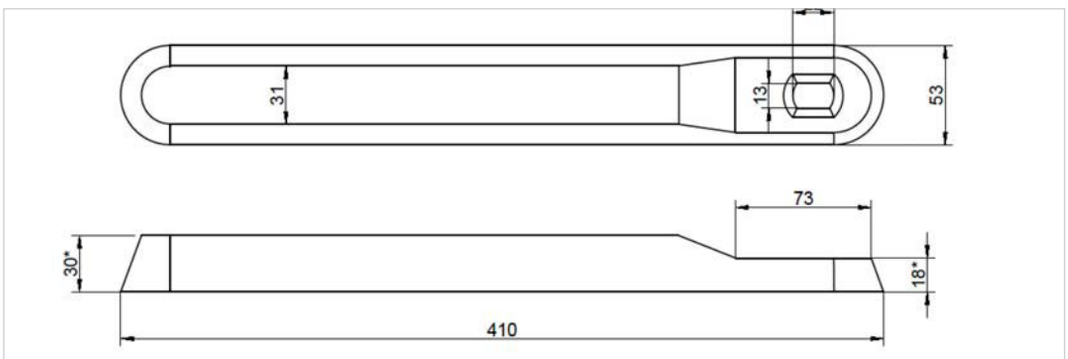
Besides bar- and rod solders of course we also produce, which are supplied either as solid wire or as wire filled with fluxing agent.

Since the constant further development of all consumable solders generally takes on a significant role for us, this material group is also characterized by very high individuality and product variety. Always with the higher-level objective, to adapt the necessary material properties perfectly to the appropriate processing.

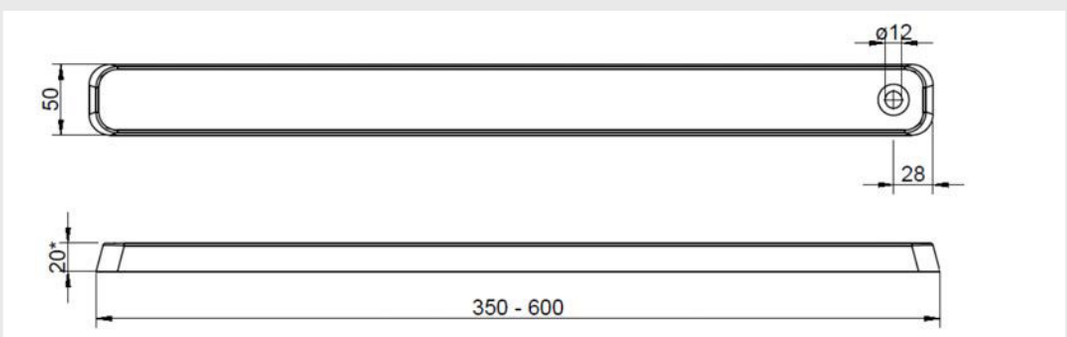
THAT FITS LIKE A GLOVE.
TAILORED. STANDARDIZED. INDIVIDUAL.

Some of the formats available from Feinhütte Halsbrücke GmbH are shown below. If you require another geometry, we will be very happy to advise you. Talk to us about it.

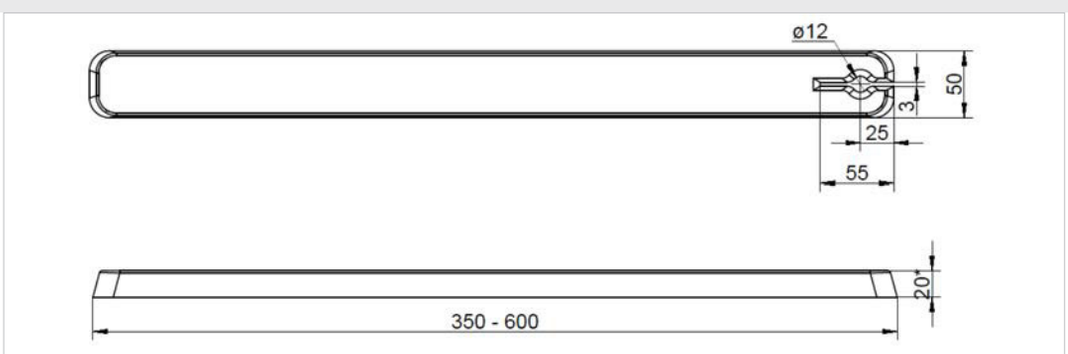
EYE BARS
TYP C



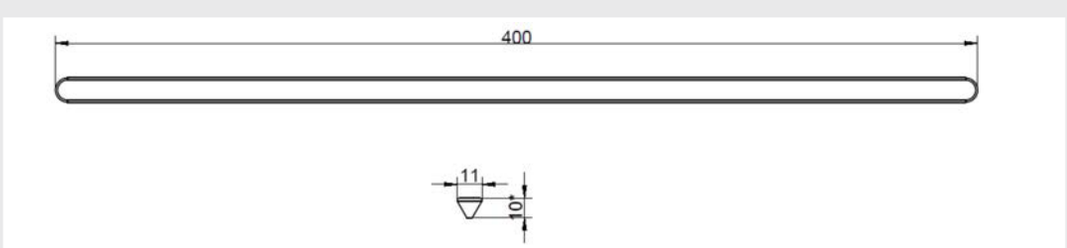
EYE BARS
TYP G



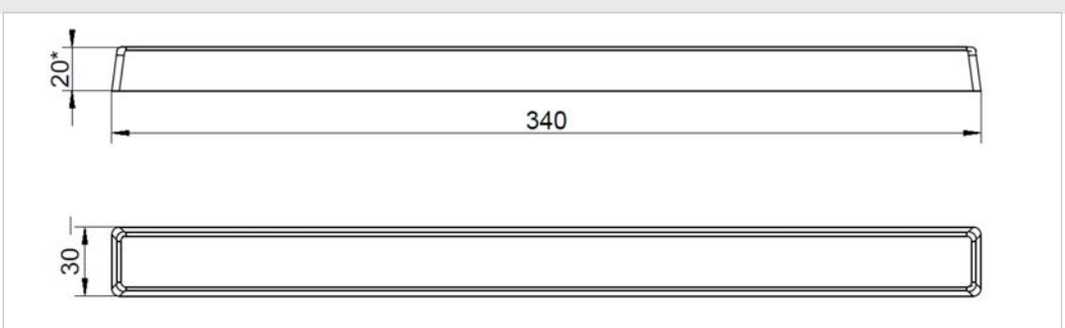
EYE BARS
TYP O



SOLDER RODS
TYP 3K



SOLDER RODS
TYP 4K



FROM ANODE TO PELLET, FROM TIN TO ANTIMONY. EXCELLENCE DUE TO TRADITION. SINCE 1612.

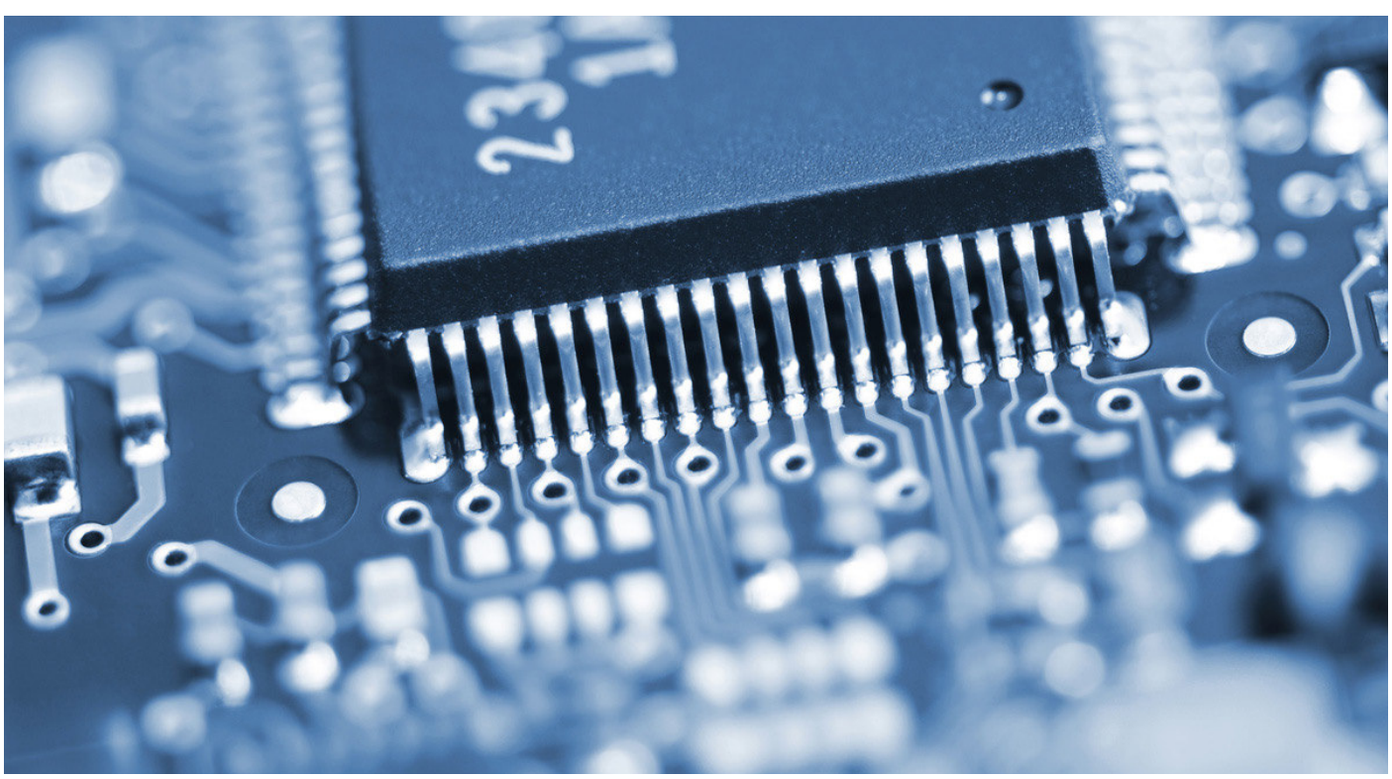
The following table of available soft solder alloys should give you a basic insight into the world of manifold soft solders. If the metal alloy that you are looking for is not listed, we kindly ask you to talk to us about it. You are very welcome at any time.

COMPOSITION OF EMS SOFT SOLDER ALLOYS

Designation	Alloy number number	Alloy code	Technical name	Melting point	Melting range	Density (g/cm)	RoHS	Active
Sn99,9	---	Sn99,90*		3NSN	232	7,3	lead-free	●
Sn95Sb5	201**	Sn95Sb5**		SnSb5	235-240	7,3	lead-free	●
Bi58Sn42	301**	Bi58Sn42**		BiSn42	139	8,7	lead-free	●
Sn99Cu1	401**	Sn99,3Cu0,7**		SnCu1	227	7,3	lead-free	●
Sn97Cu3	402**	Sn97Cu3**		SnCu3	227-310	7,3	lead-free	●
Sn99Cu1spezial	403**	Sn99,25Cu0,7NiO,05**		SnCu1Ni	227	7,3	lead-free	●
Sn99Ag0,3Cu0,7	501**	Sn99Cu0,7Ag0,3**		SAC0307	217-227	7,3	lead-free	●
Sn99,7Ag0,3	---	Sn99,7Ag0,3		SAC0300	217-227	7,3	lead-free	●
Sn95Ag1Cu4	502**	Sn95Cu4Ag1**		SAC140	217-353	7,4	lead-free	●
Sn92Ag2Cu6	503**	Sn92Cu6Ag2**		SAC260	217-380	7,5	lead-free	●
In52Sn48	601**	In52Sn48**		---	118	7,3	lead-free	●
Sn96,3Ag3,7	701**	Sn96,3Ag3,7**		SAC370	221-228	7,4	lead-free	●
Sn97Ag3	702**	Sn97Ag3**		SAC300	221-224	7,5	lead-free	●
Sn96,5Ag3,5	703**	Sn96,5Ag3,5**		SAC350	221	7,4	lead-free	●
Sn95Ag5	704**	Sn95Ag5**		SAC500	221-240	7,4	lead-free	●
Sn96,5Ag3Cu0,5	711**	Sn96,5Ag3Cu0,5**		SAC305	217-220	7,4	lead-free	●
Sn95,8Ag3,5Cu0,7	712**	Sn95,8Ag3,5Cu0,7		SAC3507	217-218	7,4	lead-free	●
Sn95,5Ag3,8Cu0,7	713**	Sn95,5Ag3,8Cu0,7**		SAC3807	217	7,4	lead-free	●
Sn95,5Ag4Cu0,5	714**	Sn95,5Ag4Cu0,5**		SAC405	217-219	7,4	lead-free	●
Sn98,3Ag1Cu0,7	715**	Sn98,3Ag1Cu0,7**		SAC107	217-224	7,4	lead-free	●
Sn98,5Ag1Cu0,5	716**	Sn98,5Ag1Cu0,5**		SAC105	217-227	7,4	lead-free	●
Sn96Ag2,5Bi1Cu0,5	721**	Sn96Ag2,5Bi1Cu0,5**		---	213-218	7,4	lead-free	●

Designation	Alloy number	Alloy code	Technical name	Melting point	Density (g/cm)	RoHS	Active
Sn91Zn9	801**	Sn91Zn9**	SnZn9	199	7,3	lead-free	●
Sn89Zn8Bi3	811**	Sn89Zn8Bi3**	---	190-197	7,3	lead-free	●
AOX371***	---	SnAg3Ni0,07Ge0,015***	AOX371	217-219	7,4	lead-free	●
AOX571***	---	SnAg0,05Cu0,5Ni0,07Ge0,015***	AOX571	227	7,3	lead-free	●
AOX751***	---	SnAg0,3Cu0,7Ni0,05Ge0,015***	AOX751	217-227	7,3	lead-free	●
AOX755***	---	SnCu0,7Ni0,05Ge0,005	AOX755	227	7,3	lead-free	●
AOX3571***	---	SnAg3Cu0,5Ni0,07Ge0,015***	AOX3571	217-219	7,4	lead-free	●
AOX12752***	---	SnAg1,2Cu0,7Ni0,05Ge0,02***	AOX12752	217-222	7,4	lead-free	●
Sn63Pb37E	102**	Sn63Pb37E	---	183	8,4	leaded	●
Sn60Pb40E	104***	Sn60Pb40E	---	183-190	8,5	leaded	●
Pb95Sn5	123**	Pb95Sn5	PbSn5	300-314	11,1	leaded	●
Sn60Pb39Cu1	161**	Sn60Pb39Cu1	---	183-190	8,5	leaded	●
Sn62Pb36Ag2	171**	Sn62Pb36Ag2	---	179	8,4	leaded	●
Pb98Ag2	181**	Pb98Ag2	PbAg2	304-305	11,1	leaded	●
Pb95Ag5	182**	Pb95Ag5	PbAg5	307-370	11,0	leaded	●
Pb93Sn5Ag2	191**	Pb93Sn5Ag2	---	296-301	11,0	leaded	●

***EN 610** ****DIN EN ISO 9453** *****Works standard based on DIN EN ISO 9453**



SUPERIOR CORED AND SOLID WIRES.
NO COMPROMISES.

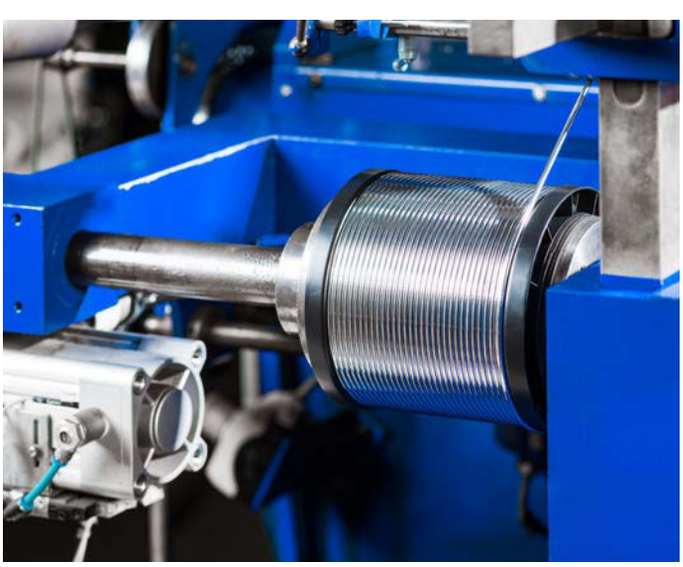
Besides solid formats such as bars or rods, we design, develop and manufacture a variety of different wires. Either as solid wire or core solder.

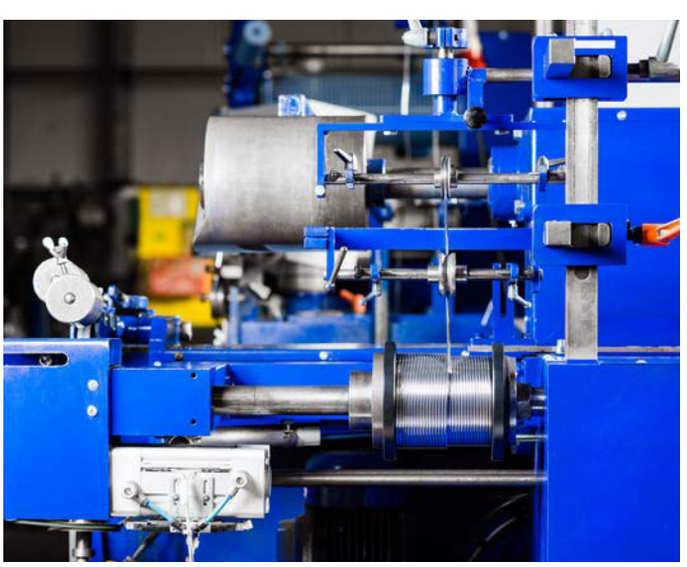
Our several centuries of history and the accompanying expertise enables us to produce almost all soft solder alloys in the extrusion process.

Our own innovations and close cooperation with the ultimate users as well as our own quality commitment also formed here the solid foundation of our success.

Consequently, wire diameters starting at 0.23mm for SMD soldering through to extruded rods up to 22.0mm in diameter are also included in the portfolio.

Naturally, both the alloys as well as the fluxing agents themselves are consistently standardized and always subject of the highest quality requirements.





ANODES.
FOR AN EXCELLENT COATING.

In metal finishing and electroplating, metals or metal alloys are electrochemically dissipated resp. further processed with the superordinate aim, to coat components or workpieces metallurgically-chemical. The aims of these coatings are, for example, the manufacturing of a surface- and corrosion protection, the finishing of contact parts or the „metal finishing“ of visible parts.

ANODES

For the majority of very demanding applications and end products, we develop, produce and supply suitable anodes. That includes plate- and rod anodes as well as bulk material anodes – in other words sticks, pellets or balls.

Thereby, above all the focus is on pure tin anodes with a lead component of max. 0.03 %, 0.01 % or 0.005 %.

The most important properties of solid anodes include their very precise material homogeneity. It is the key for a reliably predictable dissolution behavior of the anodes and therefore a trouble-free operation. The anodes casted or pressed by us convince through material homogeneity and a correspondingly optimized material consumption.Which format is suitable in each case, depends on the application, the surfaces to be coated and the specified quality parameters.

- STRIP ELECTROPLATING
- FRAMEWORK ELECTROPLATING
- BARREL ELECTROPLATING
- SELECTIVE ELECTROPLATING

FORMAT GROUP 1.0

Below you can find an extract of some of the anode formats from our current portfolio, which we produce order-related for you amongst others.

PLATE ANODES
WIDTH: 100mm

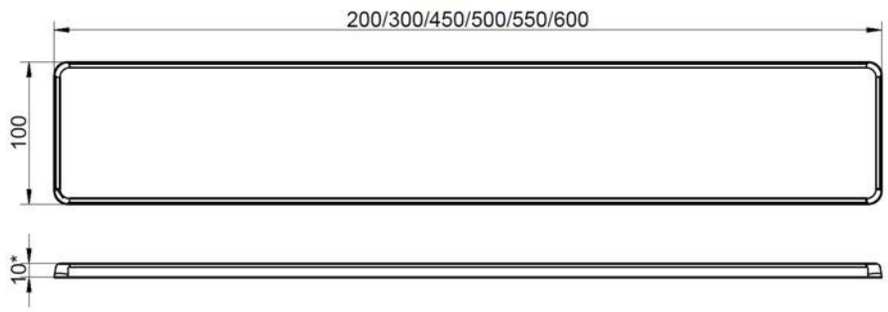
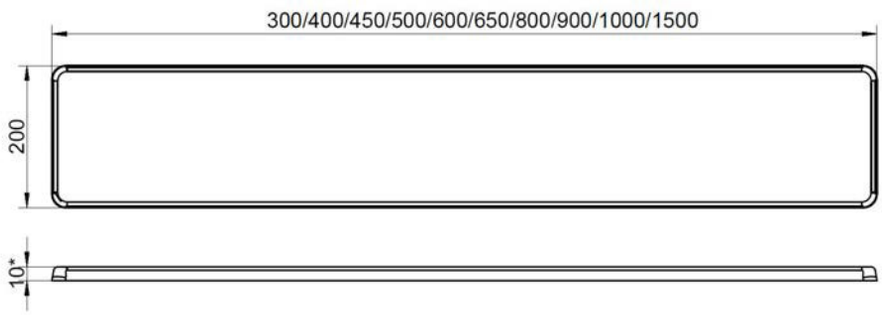
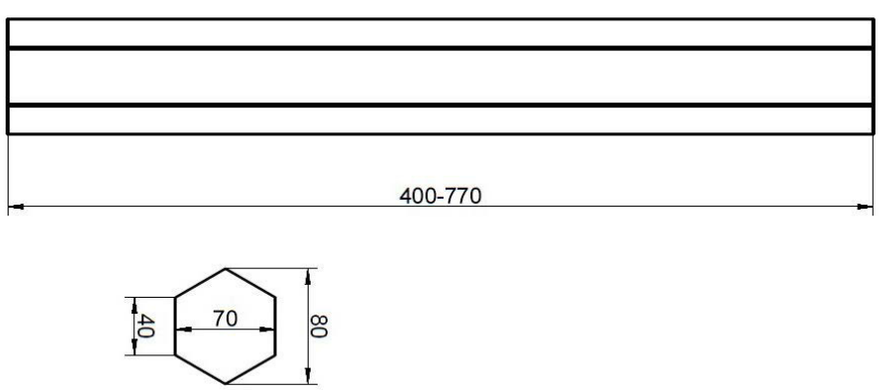


PLATE ANODES
WIDTH: 200mm

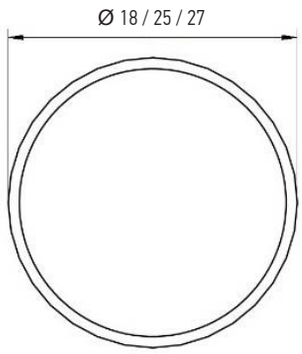


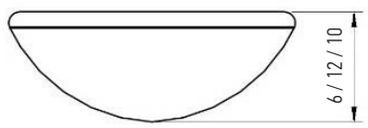
ROD ANODES
HEXAGON



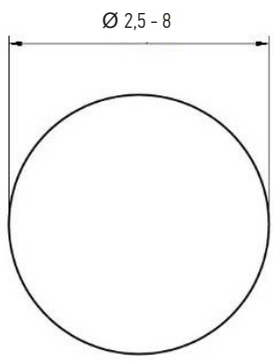
FORMAT GROUP 2.0

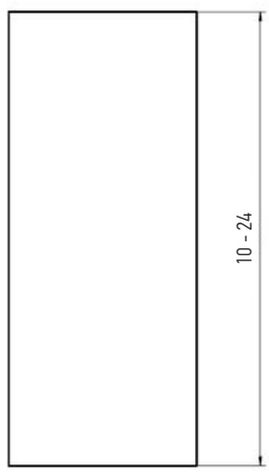
PELLETS
(BULK MATERIAL ANODES)



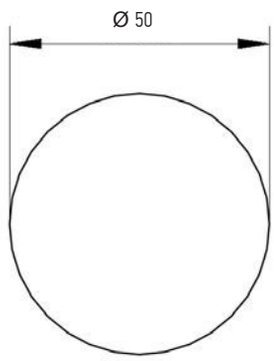


STICKS





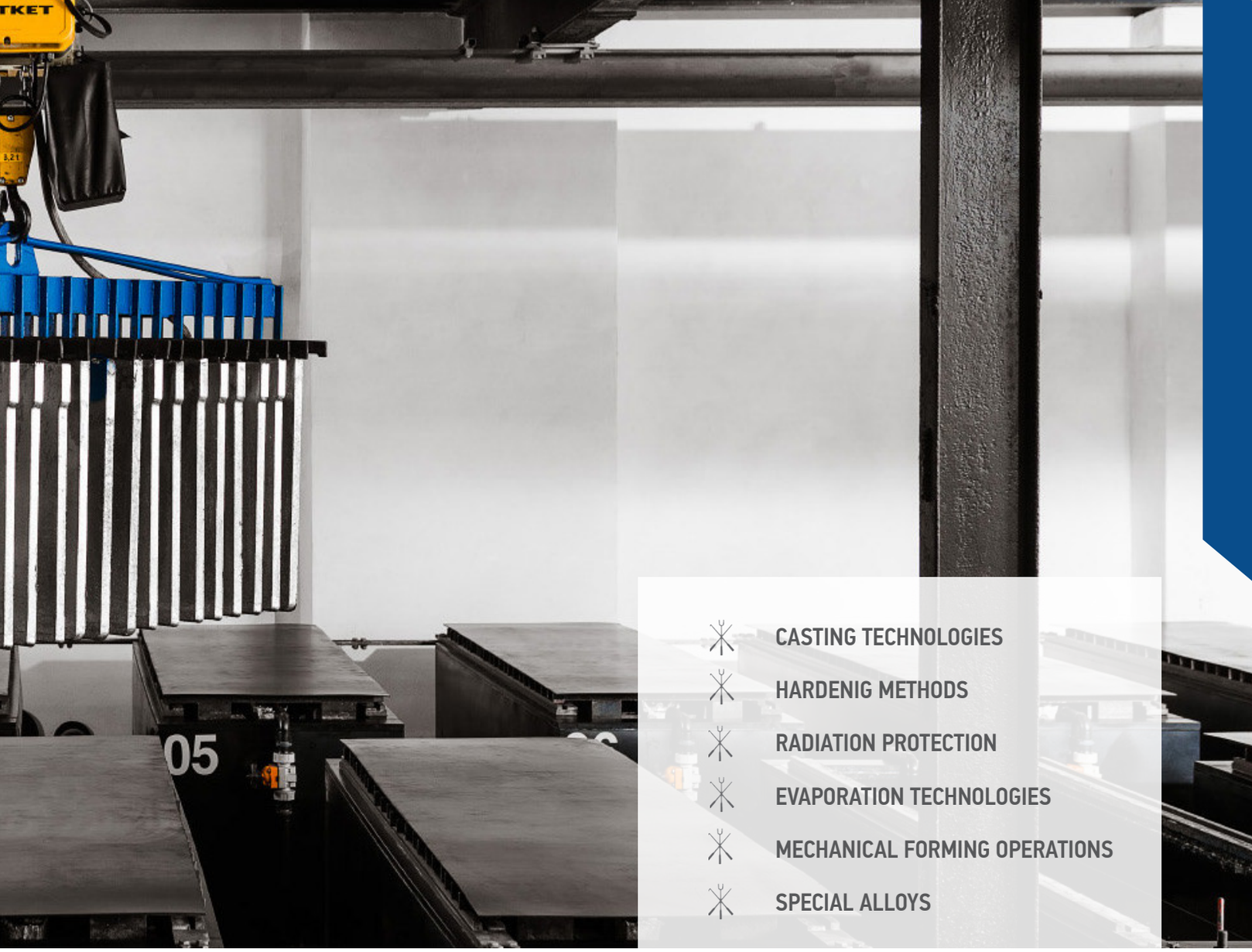
BALLS



MATERIAL = QUALITY

We can of course supply all pure material anodes consisting of e.g. tin, lead or indium, regardless of whether rod-, plate- or bulk material anodes, in a variety of material qualities. In addition to this, we are also able to supply anode bodies consisting of application-related soft solder alloys.

TIN	3NSN (Sn99,9)	3N5SN (Sn99,95)	4NSN (Sn99,99)
LEAD	3NPB (Pb99,9)	3N5PB(Pb99,95)	4NPB (Pb99,99)
INDIUM	3NIN (In99,9)	3N5IN (In99,95)	4NIN (In99,99)



- CASTING TECHNOLOGIES
- HARDENIG METHODS
- RADIATION PROTECTION
- EVAPORATION TECHNOLOGIES
- MECHANICAL FORMING OPERATIONS
- SPECIAL ALLOYS

INDUSTRY X.0

Industrial applications are often characterized by complex application profiles and high requirements on constant qualities. At the same time trustful delivery, delivery capability as well as a flexible player of a fundamental role, especially when it is up to suitable alloys for certain operational purposes. In addition industrial processes are constantly in motion: optimizations, adjustments and innovations ensure a continuous optimization- and modification drive.

ALLOY SPECIALIST

As a specialized supplier and partner of the industry, we develop, produce and supply a great variety of alloys: Starting with special lead and lead alloys for radiation protection and for – last but not least listed – roof reconstructions through to counter- and trim weights for elevator construction and shipbuilding.

For this, among other things the material groups Pb, PbCu, PbSb, PbSn are used. Due to the increasing electromobility and the very dynamic market of rechargeable battery production, we supply special tin- as well as high reliable lead-free alloys. Other industrial sectors, such as, for example, plain bearing-, pressure gauge- and web board production, are also included in our industrial portfolio.

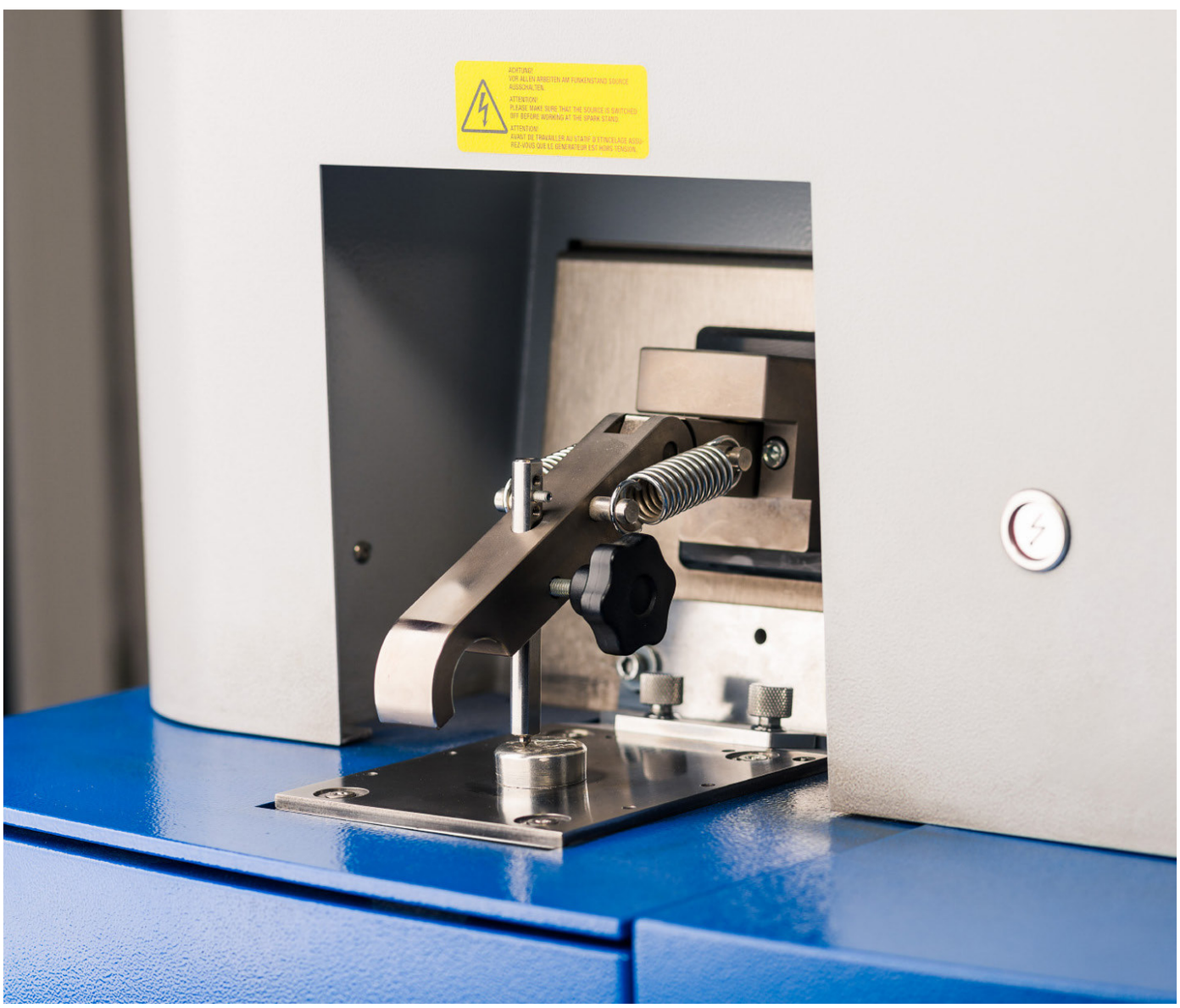
ANALYTICAL. FORWARD-THINKING.
CHECKING BETTER. MAKING BETTER

In the modern laboratory diagnostics of metallurgy and industry, much revolves around product quality, legal stipulations and environmental regulations: As a result metal- and alloy compositions are determined precisely to the fraction of a gram and even the lowest concentration values of unwanted elements are checked with according to existing quality standards.

In addition to this the entire subject of recycling takes place. Practically every activity is subjected to strict laboratory controls, for which highly developed analysis methods and modern equipment such as emission spectrometer and X-ray fluorescence devices are employed.

For the permanent quality monitoring, documentation and development of your high-quality soft solders, we offer both the solder bath analysis as well as the entire range of a comprehensive solder bath management.

This way we can point out the Actual status of your solders for you during the sampling, by checking and documenting the chemical composition in detail. Besides the general quality control, this way possible negative interactions in the interactions between very different metals and applications can be detected early on – and being avoided.



FEINHÜTTE.
GOOD DUE TO TRADITION.

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