Quality in sample preparation for the steel industry
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HERZOG
Your Partner for automatic sample preparation

“Made by HERZOG”: Ever since HERZOG was founded, our customers all over the world have been placing their confidence in intelligent solutions and the quality of our first-class products. As a leading supplier of laboratory systems, we develop innovative future-oriented machines for the world market.

We see ourselves as a partner of the international primary industry, offering our customers consulting and engineering from a single source, with everything from the supply of high quality machines to full laboratory automation. Satisfied customers and outstanding products are to a great extent the achievement of our motivated and highly qualified employees. As a family business with tradition, we feel a very special commitment to our employees as well as to our customers. Social responsibility and sustainability are by no means mere theoretical terms for HERZOG – they are part of the dynamic entrepreneurship which we practice every day.
HERZOG is the leading supplier of sample preparation systems in the iron and steel industry. HERZOG Systems are used by the world’s leading steel manufacturers for quality assurance and process control in the production process.

Our integrated solutions provide the optimal preparation for steel, iron and slag samples for OES and XRF as well as CNS analysis.

Innovative HERZOG Steel Solutions are oriented according to customers’ requirements and are based on an excellent collaboration with the world’s leading steel producers.
Components of HERZOGSteel

The individual components of HERZOG Steel have been developed for the requirements of the steel industry and adapted to suit each in the best possible way.

Automation
HERZOG offers automation which optimally meets the customers’ requirements. We find the best automation solution including robot, linear transport systems or other handling devices. Robotic systems guarantee a particularly flexible handling of samples controlled by our Prepmaster system. Extension or modification of a system configuration or exchange of components is easily possible with the use of robotics.

Linear system
A linear configuration of HERZOG components is an absolutely reliable solution if flexible sample handling is not top priority. Input and output magazines as well as the freely configurable connections to the analyzing systems guarantee comfortable and fast sample processing.

Stand-alone-solutions
All HERZOG components are designed for automatic and manual operation. At a later stage, most of HERZOG equipment can be easily integrated into automation if the sample volume has increased. HERZOG offers full flexibility.
HERZOG Steel solutions can be individually configured to meet the requirements of our customers.

HERZOG machines are designed for multifarious applications – whether as a stand-alone solution or as an integral part of a fully-automated robotic system. Furthermore, the modular way of construction allows an easy adaptation to the specific customer’s requirements. Together with our team we will find the optimal solution for you.
HERZOG Steel offers:

- **Processing of different steel and iron qualities:** HERZOG Systems enable the optimum preparation of every sample surface from raw iron samples to high-alloyed specialty steels.

- **Processing of different sample forms:** HERZOG Systems can be adapted to suit any individual sample form and consequently guarantee optimum analysis results.

- **Management of different sample figures:** HERZOG Systems can be configured according to the desired sample capacity, and include manual solutions for just a few samples as well as complete automation arrangements for thousands of samples per day.

HERZOG Steel Solutions are flexible and can adapt to the individual conditions of each production process.
Velocity

Modern production processes require fast and thorough monitoring of the manufacturing process. HERZOG Steel Systems have been designed as high-speed solutions to guarantee an optimum process performance:

The perfectly tuned HERZOG components allow the control of the production process within a narrow time frame:

- Fastest possible transport via HERZOG Airtube
- Speedy unpacking and transfer of samples
- High sample handling speed by means of optimized handling systems
- High milling and grinding speeds
- Intelligent sample management supported by our control software (Prepmaster) with a full capacity workload of all components and high-priority processing of special samples
Intelligence

Our software solution, consisting of Prepmaster and Resultmaster, is a high caliber process visualization system for the uncomplicated and intelligent monitoring of our sample preparation and analysis procedure.

Prepmaster and Resultmaster combine complete functional standards with a user-friendly surface. They offer optimal project development, scalability and adaptability to the special requirements of each customer. Prepmaster and Resultmaster are optimally tailored to the HERZOG equipment but also allow complete integration of other system components.
Our Prepmaster is designed to guarantee top functional standards, user-friendly and graphic interface, scalability and openness interfacing with all PLC and spectrometer systems. Prepmaster meets the requirements of the steel industry for an automatic and speedy sample preparation.

Some of the distinguished features of Prepmaster are:

- **Adaptive and priority-controlled sample administration** for quickest possible and smooth preparation of samples. The intelligent system manages high numbers and peak loads of samples without problems. Priority samples are given preference to receive important analysis results as quick as possible.

- **Sophisticated and flexible alarm systems**: The system immediately alarms if analysis results are out of the normal range. It takes appropriate measures like re-running the analysis or the sample preparation process.

- **Web-based design**: Web interface within Prepmaster allows the display of Prepmaster information on different web clients. This program architecture turns Prepmaster into a flexible system with multi-user capability.

- **Remote control**: The remote control function of Prepmaster provides the base for an easy remote maintenance of the system and therefore fast and uncomplicated servicing.

- **Redundancy through backup-systems**: In the unlikely case of failure, Prepmaster backup options guarantee the frictionless and continuous operation of the system. We offer a server-based virtualized system providing a fully executable standby system in case of need.
Resultmaster is a separate IT system for storage, visualization and analysis of information of the sample analysis process. The system allows a quick and target-oriented control and modification of the quality control process. Due to the universal program architecture and the modern ASP.NET web technology, Resultmaster can be individually adjusted to the specific requirements of each customer.

Main functions of Resultmaster are:

- **Data Acquisition:** The import manager of Resultmaster provides multiple interfaces to all types of analyzers. The interface configuration can be easily adjusted and extended. In addition, the user can enter data online from every access point of the laboratory.

- **Data Preparation:** Following data acquisition the results are filtered by pattern, converted into the specific customized laboratory format and transferred into the database structure. If necessary, the data values can be recalculated using an algorithm and joined to an existing or new table.

- **Data Management:** Data management is under control of an integrated relational database for storage and organization of data. The database structure is completely disclosed and accessible for the administrator.

- **Data Presentation:** The edited data are simultaneously displayed in any number of web clients. The software is protected by passwords and regulated by access rights. The communication to the Web Server uses TCP/IP protocols and can be encrypt by SSL. If there is a connection to Prepmaster, Resultmaster also provides information about the sample preparation.

- **Data Analysis:** Resultmaster provides functions for sorting, filtering and grouping data as well as applying statistics. The selected results can be displayed using different diagram types.

- **Data Distribution:** Resultmaster exports data to the user or specific IT systems of the customer. Therefore, Resultmaster provides multiple interfaces, export algorithms and direct access to the database of the customer. All results can be easily outlined by the report function of Resultmaster.
Our milling machines are specially designed for the requirements of sample preparation. Due to their analysis-perfect processing of all metal grades they achieve optimal OES analysis results with the shortest preparation times. Our machines offer exceptional solidity for the highest possible reproducibility and maximum range of lifetime.

The operating concept of HERZOG milling machines is very easily and optimally adjusted to the requirements of the user. Alignment and clamping of the samples as well as selection of the milling cutter run automatically. Feed speed, milling depth and cutting speed can be set as program parameters at the control panel or via Prepmaster.

There are different machines and options available for any need.
HS-FF 2000

The HS-FF 2000 is the universally usable, flexible and fast solution for the processing of steel samples. Due to the special design and the extremely sturdy spindle bearing, the HS-FF 2000 allows the preparation of even the hardest iron and steel samples without problems. The machine can be easily integrated into robot-based automation systems or can be operated manually. The machine is accessible from two sides and can therefore be included into two robot circles.

Two independently operated precision milling spindles can be fitted with milling cutters for various material grades. There is no need to change cutters when changing from steel to iron and vice versa. Separate programs for automatic de-burring of round calibration samples are available in conjunction with a special milling head.

HS-FF

The HS-FF is the optimal milling device for preparation of steel samples. Due to its universal design it can be easily integrated into container laboratories, linear systems or robot automation systems. Of course, the sample can also be introduced manually via an infeed device.

The HS-FF is available with numerous options, including different types of input and output magazines for samples.
The HS-CF is the ideal machine for the fully automatic processing of conical steel and iron ore samples. The machine has been designed for use in the laboratory and in the production of sample material for OES and CNS analysis. The extremely robust design permits safe, sustained processing of even the hardest material grades.

The input of samples can either be manual by the operator or automatic by a robot or via conveyor belts. Alternatively, a variety of input magazines are also available. The HS-CF can cut off samples and extract a slice of varying thickness for CNS analysis. The sample is forwarded to the milling unit with two independently operated precision milling spindles for various metal grades. Thus there is no need to exchange tools when changing from steel to iron and vice versa. A cooling unit for hot samples is included in the machines.
HERZOG provides the appropriate grinding solution for our customers’ needs – from full automation to manual stand-alone machines. There are various options available, including belt or cup wheel grinding, coarse and fine grinding, sample water cooling, as well as an optional milling cutter for, e.g., calibration samples.

Core characteristics of our grinding machines are compact construction, easy operation and highest safety standards – all with the objective of optimum surface preparation.
HBF 4000

The HBF 4000 with its integration of the different machining methods, “grinding belt” or “milling cutter” for fine machining, ensures optimum sample preparation for the analytical requirements for samples with all degrees of hardness and alloys. The HBF 4000 also allows the grinding belt and milling cutter to be used not only in combination but also for separate grinding and milling operations. On steel with very low carbon contents, abrasives can leave residues in the form of minute carbon particles which lead to falsified and useless analysis results. For these samples, use of the miller instead of fine grinding after coarse grinding is therefore the right decision. Finish cutting of steel samples with low carbon contents using the milling cutter guarantees precise analysis results for evaluation.

HB 3000

The fully automatic HB 3000 cup wheel and abrasive belt grinding machine permits automated sample preparation for spectroscopic analysis with all its advantages including improved reproducibility. The HB 3000 can be easily integrated into any kind of automation.

The HB 3000 is characterized by its rapid and precise grinding of iron, steel and particularly high-alloy steel samples in a wide range of geometries, the temperature of which may reach 800°C. The HB 3000 is equipped with program-controlled intermediate cooling during the grinding processes to ensure optimum grinding results. This cooling system enables incandescent samples to be processed.

In conjunction with the abrasive, grain and hardness, the integration of cup wheel and abrasive belt into a single machine ensures that preparation of the sample meets the requirements of analysis perfectly. The abrasive belt, for example, is suitable for absolutely exact fine grinding of high-cost calibration samples. Conversely, optimum service life is achieved with coarse grinding by means of the cup wheel.

Optimized machine exploitation by integration of the cup wheel and abrasive belt - in combination or separately.

After roughing on the coarse belt grinding, fine grinding can take place. Alternatively, steel with very low carbon content can be milled.
HT 3000

The fully automatic HT 3000 cup wheel grinding machine permits automated preparation of samples with different geometries. The pneumatic clamping unit enables symmetrical samples to be gripped reliably and in a defined manner for high grinding capacities and short sample preparation times.

Optimized cup wheels guarantees perfect sample preparation.

HB 4000

Universal sample preparation for spectroscopic analysis: The method of operation with program-controlled grinding process offers significant improvements in the reproducibility of the sample preparation and thus accurate analysis results in less time and at lower costs.

Optimum sample preparation of iron and steel samples: By means of the HERZOG Dual Disk Surface Grinder it is possible to achieve a precision flat surface with reduced material cost.

HTS 2000

Grinding machine for the grinding of steel and iron samples of different dimensions for the purpose of spectroscopic analysis.

Manually operated swing grinding machine for grinding of pig iron and steel samples with a reproducible ground surface.

HT 350

HB 4000

HTS 2000

HS 200
Our machines for cutting and punching enable the processing of sample and pin for further analysis. We provide solution for all type of application in the steel industry.
HUST

The HUST is the machine for production of punched samples for further gas analysis to determine the content of carbon, nitrogen and sulfur. Within one operational step, the HUST prepares 3 or 4 punched samples with a weight of approx. 1 g. The HUST can be manually, automatically or semi-automatically operated. The HUST can be easily connected to other components of HERZOG Steel automation equipment, such as the HS-CF.

VST/VNU

The VST is a fully automatic machine for cutting samples for spectrographic analysis within the shortest possible time. The VST can be used for all steel types (including pig iron), regardless of hardness and alloy type. Efficacious sample cooling and air exhaustion are integrated.

The VNU is a manual cut-off machine for cutting. The machine offers extremely easy handling with sensitive cutting by hand operated rocker bar. The cutting discs can be easily exchanged. The cutting chamber is specially designed for maximum security and minimum dust generation.

Machine operations can be easily adjusted by the integrated PLC.

The VNU offers multiple fixing facilities for various work pieces.

HERZOG cutting disks are specially designed for our machines.
HS-CF

The HS-CF is the ideal machine not only for milling but also for fully automatic cutting of cylindrical and conical steel and iron samples. One possibility is to cut off a sample for the OES. The other possibility involves the extraction of a slice of varying thickness between 4 to 6 mm.

The intelligent servomotor torque control guarantees particularly effective material cutting. The sturdy cutting disc drive in conjunction with the HERZOG high capacity cutting disc guarantees top speed with maximum surface quality.

HSA

The pneumatic pin cutter is optimized for straightforward removal of the sprue from steel samples produced by sampling probes. It can be used for all standard sample geometries such as round and oval samples or double medallions. The cutting action is performed with constant precision and is so accurate that no reworking is required. Thanks to its extremely robust construction the pneumatic pin cutter is not only the right choice for laboratory use but can also be used under tough conditions on-site.
Slag sample preparation

Slag preparation involves special requirements to which we respond by our crusher, pulverizing mills and pellet presses. Accordingly, we offer magnetic separation for our crusher and mills. Furthermore, the pulverizing process can be optionally combined with wet cleaning and blank sample dosing to avoid contamination. Our pellet presses can be equipped with several press tools.

HERZOG offers the full choice for slag preparation from full automation to manual material processing. Also a linear combination of crusher, mill and press is available which can easily be integrated into every type of automation.
HP-C

The HP-C fully automatic jaw breaker machine is a cost effective solution for the crushing of a range of mineral types including ores and slags. The HP-C guarantees a fully automatic operation with pre-selected programming parameters, highest safety standards and minimum noise exposure.

HP-M

HERZOG HP-M series pulverizing mills are suitable for grinding minerals such as slags and minerals. Additional special features are automatic emptying and cleaning of the grinding vessel. Cleaning is carried out pneumatically by wet-grinding followed by air drying. Wet-grinding has the particular advantage that even the smallest grinding residues are removed. The HP-M can be easily integrated in robot-based automations.

HP-P

HERZOG HP-P series pellet presses are the basis for the manufacture of stable pressed pellets. All the parameters which are important for the pellet pressing process can be preset to achieve the optimal homogeneity and density of each single pellet. This ensures a high degree of reproducibility and perfect quality of pressed pellets from all ground materials for optimal XRF-analysis.

HP-MP

The HP-MP integrates the components for pulverizing and pelletizing in one machine. The automatic machining cycle ensures extremely fast and reproducible analytical results. The space saving design makes this machine ideal for laboratory environments. The pulverizing process can be exactly controlled and adjusted by easy and flexible setting of machine parameters. The high RPM of the drive motor guarantees a short grinding process even with hard materials.
Due to their modular design, the HP-CA crusher, the HP-MA pulverizing mill and the HP-PA pellet press are especially suitable for linear automated systems. The fine tuning and the intelligent control of the machines lead to perfect analyzing results and short sample preparation times. There are different options available including wet cleaning, sample dosing with pre-sample disposition and magnetic separation. The HP-CA/MA/PA is available with different input and output magazines and can be integrated in robotic automations.

**HP-CA**

With its comprehensive and complete automation, the HERZOG HP-C automatic jaw breaker guarantees precise, reproducible analytical results. Careful cleaning by compressed air after each crushing cycle prevents contamination of subsequent samples. The HP-C is fully enclosed and insulated against noise and requires a minimum of manual intervention and maintenance. Safety switches ensure maximum safety.

**HP-PA**

All the important parameters for the pressing process can be adjusted by means of the program. Pressing pressure and sequence, compression speed and pressure holding time are individually defined in order to achieve the correct properties for the analysis of every individual pressed sample.

**HP-MA**

Various options make the HP-MA the optimal machine for slag preparation, such as grinding vessel wet-cleaning, sample dosing with pre-sample disposition and magnetic separation. The high RPM of the drive motor guarantees short grinding processes and the robust construction ensures long service life.
<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
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<tbody>
<tr>
<td>HP-M100P</td>
<td>The fine grinding mill is suitable for the pulverization of different types of sample material, including silicate, cement, ceramic material, ores, sinter and slags, as well as ferro alloys and various other minerals.</td>
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<tr>
<td>HSM 100</td>
<td>The HSM 100 offers the full benefits of HERZOG vibration mills – controlled grinding processes for the preparation of samples for XRF analysis. Control by programmable controller results in a substantial improvement in the reproducibility of sample preparation and consequently optimum analysis results.</td>
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<tr>
<td>HTP 40/60</td>
<td>The presses offer the full benefits of program-controlled pressing processes. Control by programmable controller results in a substantial improvement in the reproducibility of sample preparation, and consequently optimum analysis results.</td>
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<tr>
<td>TP 20/40/60</td>
<td>This manually operated hydraulic press allows all the compacting operations common in the laboratory to be carried out.</td>
</tr>
<tr>
<td>TP 40/2d / TP 60/2d</td>
<td>By means of this manually operated hydraulic pelletizing press it is possible to easily produce tablets with different diameters (depending on the spectrometer).</td>
</tr>
<tr>
<td>BB 100/200</td>
<td>The jaw crushers BB 100 and BB 200 crush medium hard, hard, brittle and hard-ductile materials with degrees of hardness up to 10 according to the Mohs scale.</td>
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<tr>
<td>BB51</td>
<td>The jaw crusher BB 51 is engineered for fast but gentle crushing of medium hard, hard, brittle and tough materials. These units are particularly suitable for processing stone, minerals, ores, glass, ceramics, construction materials, brittle metal alloys, slag, synthetic resins and many other hard and brittle substances.</td>
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</table>
Our airtube system transports the samples reliably into the laboratory. Installation of HERZOG airtube components is feasible even under difficult spatial conditions or at long distances. The sending and receiving station provide for the automatic integration of sample information into the LIMS and Prepmaster software. The perfect interaction between hardware and the HERZOG airtube management system guarantees smooth and fast transport from the plant to the laboratory.

Further processing of samples takes place in special transfer stations with unpacking of the carrier, cooling and forwarding to the next sample preparation unit.
HR-HSK

The HR-HSK is the manual unit for sending a sample via pneumatic tube as well as for receiving the returning carrier. Operation of the HR-HSK is easy. The sample material is inserted into a pneumatic tube capsule. The capsule is closed by means of the integral manual capsule opener, and then placed in the insertion point. The capsule can be dispatched to the laboratory at the touch of a button. A light on the receiving station indicates that a capsule has been received.

HR-HSK/L

The HR-HSK/L is specially designed for sending and receiving tube capsule for robot automations. All integrated machines are circularly arranged and operated by a robot in the middle. If needed HR-HSK/L machines can be put outside of the robot circle for manual operation.
HR-ES/L

The HR-ES/L is the automatic unit for sample handling in the steel automation. After input by the robot the carrier is emptied. The sample is transferred to the next unit for, e.g., milling or grinding. According to the specification of the customer, the sample previously goes through water-cooling and drying by compressed air. The HR-ES/L can manage different sample geometries including round, conical or lollypop-samples.

HR-L

The HR-L is the universal laboratory sending and receiving station for metal samples, granular material, powder samples and other sample materials. Up to eight incoming pneumatic tube lines can be integrated into the fully automatic HR-L laboratory dispatch and receiving station, depending upon the specification. When a pneumatic tube capsule is received by the fully automatic HR-L laboratory dispatch and receiving station, the capsule is opened, emptied, cleaned, closed again, and returned to the dispatching station by an integrated handling system.