

Equipment for Minting Technology



Equipment for Minting Technology – Overview



- Innovative equipment for new challenges in minting technology 3
- Success stories in minting technology – for more than a century..... 4
- Manufacturing process for coins 5
- Tailor-made systems for the manufacture of coin blanks – Schuler Blankmaster 6
- Sorting, rimming, and edge lettering – RS 50 and ST 50 S 8
- Modular and flexible control concept – Schuler ABI-Plus 10
- Precision and reliability from blank feeding to the minting process 11
- Minting presses in horizontal design – MRH range ideal for round coins and high-volume coin production 12
- Minting systems in vertical design – MRV universal application range for round, multi-sided, bi-metal and tri-metal coins 13
- Joining and coining in one operating sequence – Schuler bi-metal and tri-metal minting presses 14
- Piercing, joining, coining, and separating – Schuler Ringmaster 15
- Highest quality with automated or manual feed – Schuler multiple strike 16
- Multi-sided coins 17
- Tri-metal coins 18
- Short changeover times ensure high levels of uptime – Schuler die change 19
- Schuler Service Minting 20
- Consultation and planning worldwide – Schuler as system partner and as turnkey supplier 21
- Schuler – a comprehensive range of products 22

Innovative equipment for new challenges in minting technology

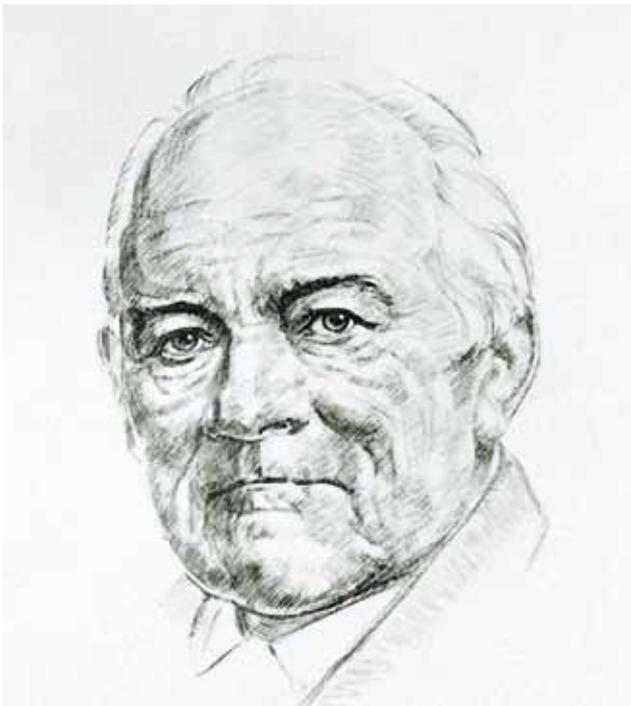
The manufacture of coins has always been especially demanding. In addition to quality and output rate, one of the most important criteria for cost-effective production is the multi-functional use of the equipment.

Over and above their function as a means of payment, coins and medallions are also “calling cards” for the individual country— often desirable collectors’ items, awards and artifacts of a particular time period. For more than a century, Schuler has been setting the standards for innovative developments in minting technology.

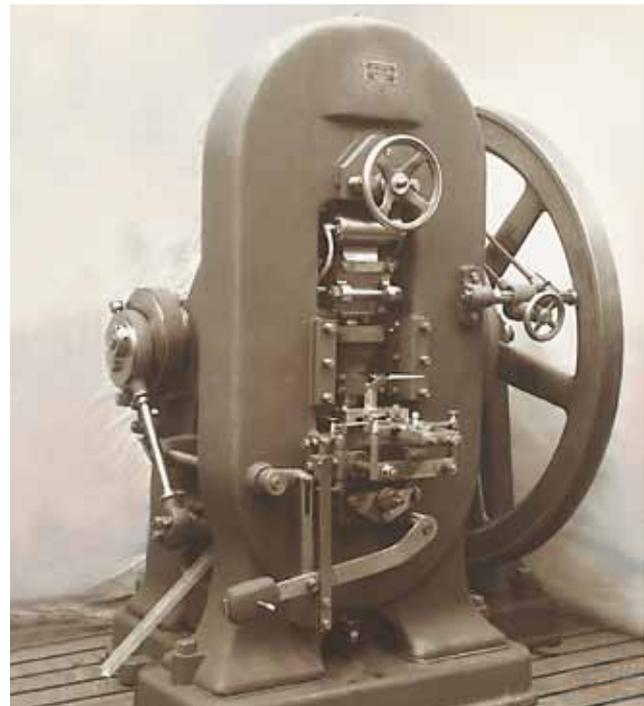
Schuler provides innovative solutions for new challenges such as tri-metal coins, new material combinations or security features.



Test specimen, China 1890



Louis Schuler, company founder



Historic press – around 1900

Success stories in minting technology – for more than a century

The manufacture of coins has been a manual process for hundreds of years. The manual spindle press, used since the Middle Ages, could produce no more than two or three coins per minute.

The Industrial Age for minting technology began only about 1870. Motor-driven knuckle-joint presses replaced the strenuous manual labor of the previous age. Schuler was already delivering presses to mints in these early days. This is evidenced by several historical documents, including a letter from the Royal Württemberg Mint dated 1874.

At the turn of the century, Schuler knuckle-joint presses were producing coins at rates up to 60 per minute – a remarkable achievement for the time. Schuler presses were also being widely exported at that time. A 1905 report by the Mint and Foundry Masters of Saxony, Buschick and Choulant, mentions a visit to Schuler and 30 presses destined for China.

With various improvements and new features, Schuler delivered more than 1,000 such minting presses to about 50 countries up to the middle of the 1930s. A number of presses from this era are still in use today.

A new era in minting technology began in the 1980s with the introduction of coining presses in horizontal design. Productivity of these Schuler presses was systematically improved – current rate of output up to 850 coins per minute.

A vertical press series based on the same concept and with nearly the same output was developed for the manufacture of circulating coins in round, multi-sided, bi-metal or tri-metal design.



National Mint, Jakarta (Indonesia), 1956



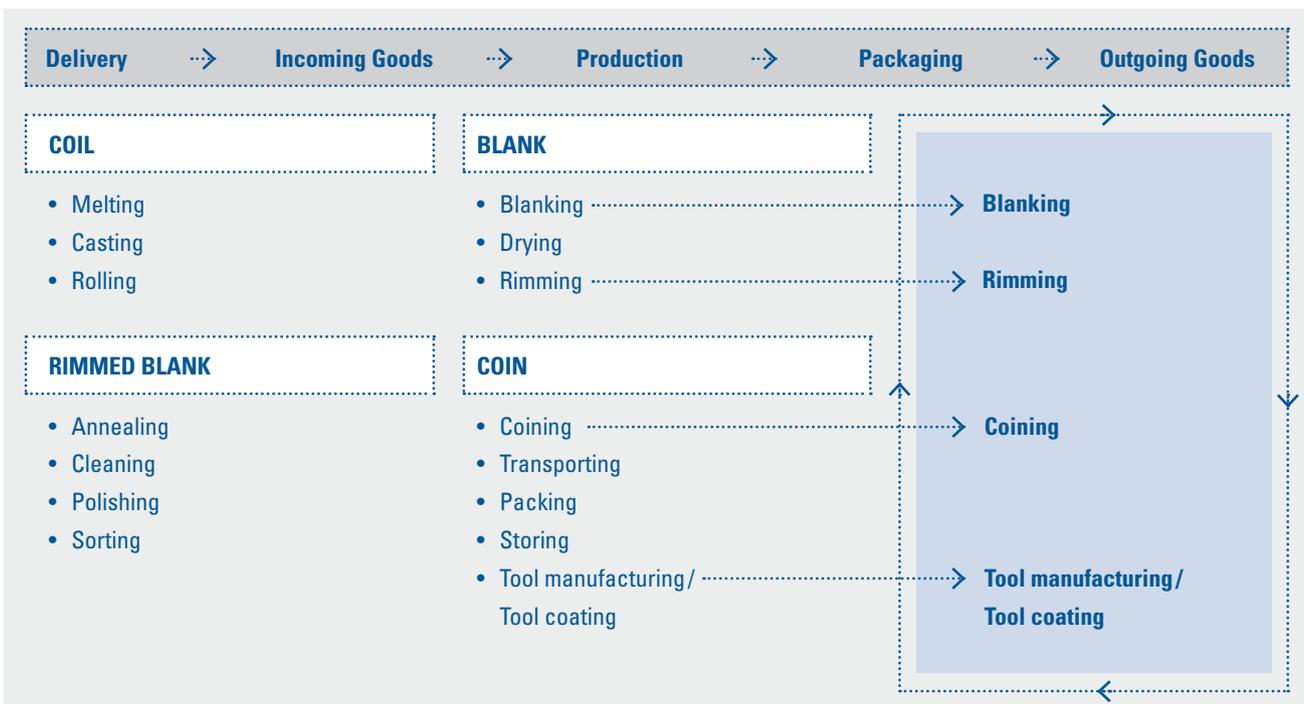
National Mint, San Luis Potosi (Mexico), 1983



Bayerisches Hauptmuenzamt (Germany), ca. 1990

Manufacturing process for coins

The following chart provides an overview of the various stages of coin manufacturing. Schuler can provide its customers with the entire product spectrum – from coil to finished coin – using expert partners for certain production stages.



Tailor-made systems for the manufacture of coin blanks – Schuler Blankmaster

For high-volume manufacture of coin blanks, Schuler offers fully automated blanking lines specially designed for this task.

A complete modular system with peripherals is available to permit assembly of a “tailor-made” blanking line.

The Blankmaster SAK processes a variety of materials – from soft to very hard – for coin blank production. The rule of thumb is: the wider the coil, the greater the output per stroke and the greater the material recovery – between 75% and 85%. The market trend toward ever harder materials, increased coil widths, higher output, and the manufacture of bi-metal rings requires ever higher press force levels – currently 1600 kN on average.

Special features of the Schuler Blankmaster SAK include:

- Extremely rigid monoblock press body, welded and stress-relief annealed
- Schuler’s unique “combination bearing system”
- Eccentric shaft mounted in roller bearings for high rigidity and low play
- Friction bearings in the connecting rod to cushion the blanking shock and eliminate vibrations
- Twin-rod and especially large pressure point for low deflection and slide tilting
- Compact die space ensures minimal deflection

The dynamic counterbalance enables the press to be installed directly onto the floor with vibration-damping elements. The fast acting clutch-brake system stops the slide within one revolution, even at the maximum stroking rate.



Schuler Blankmaster SAK

Three alternatives for the processing of blanking scrap

A separate shear, downstream from the press, cuts the scrap web into strips which are then bound together in bundles. An auxiliary scrap cutter on the press bed separates the scrap web after each stroke. This creates small pieces of scrap that are deposited into containers by means of a conveyor. A take-up coiler at the end of the blanking line rolls up the scrap web.

- **Coil thickness monitor**

The coil thickness measurement device checks deviations from the correct coil thickness in on-line operation. If there are tolerance deviations, the material is advanced to a point in front of the die space, the press is stopped in TDC and the electric roll feed moves the out-of-tolerance coil through the open die to the take-up coiler

- **Roll feed**

The line is equipped with a high-performance servo feed for coil widths of 40 to 420 mm. High-performance roll feeds with a maximum width of 630 mm are available.

- **ABI-Plus control**

ABI-Plus is a modern, user-friendly press control.

High levels of uptime, thanks to: quick tool change using hydraulic die clamping for upper and lower tool, roller rails in front of the clamping plate and hydraulic raise-lower rollers in the bolster plate. The tailor-made system is completed by peripherals such as roll feed lines, conveyors, lubrication systems, and continuous drying ovens.



Schuler Blankmaster SAK

Sorting, rimming and edge lettering – RS 50 and ST 50 S

Schuler offers high-performance systems for modern minting facilities. These systems include not only coining presses and blanking lines, but also blank sorting devices (PPE), edge-lettering (RS 50) and rimming machines (ST 50 S).

Rimming, and edge lettering

To achieve high-quality coins, the edge surfaces of the blanks after production on the blanking line have to be smoothed and rimmed. This is achieved by means of edge processing in a rimming or edge-lettering machine. Schuler equipment is characterized by high precision and output. The highest level of uptime for all such equipment is ensured by means of simple design of the tooling, and quick die changes as well as ease and simplicity of operation.

The **RS 50** is a machine for the rimming of coin blanks and embossing of letters or ornamentations into the edge of the blank. Loading is fully automated by means of a special elevator conveyor. Options include manual loading by means of a feed chute. This method guarantees a very gentle treatment, especially for precious-metal blanks. For blanks of 14 mm diameter, the rimming machine can process up to 130,000 pieces per hour.



RS 50

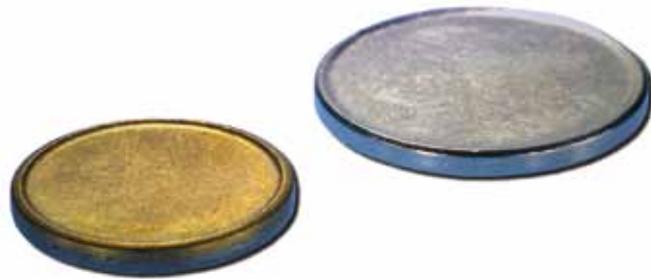


Die space

The **ST 50 S** can process blanks in the diameter range of 14 mm to 50 mm. Especially high output is achieved by the use of two feed drums. The production yield for 14 mm blanks is 600,000 pieces per hour, and for 50 mm blanks 225,000 per hour. As with the blank sorting device, the effective yield of the RS 50 and ST 50 S is influenced by weight, material and quality of the blanks.

Sorting

Schuler offers the automatic coin blank sorting device PPE, which checks the blanks for diameter, thickness and flatness. The throughput rate of the PPE, when processing blanks of 14 mm diameter is approx. 150,000 pieces per hour.



ST 50 S



Die space

Modular and flexible control concept – Schuler ABI-Plus

ABI-Plus, the Schuler line operation and information system, offers a user-friendly and versatile software for industrial PCs.

It ensures a high level of uptime for the line by fast clearance of faults, maintenance support and shorter changeover times.

ABI-Plus allows operation, maintenance and fault diagnostics for the coining press in the language of the user country. At the same time, data is collected, evaluated and stored. The data can also be transferred online to an external PC. ABI-Plus is an open software system. It permits integration and/or connection of customer-specific software modules.

The operator is informed about the status of the coining process and the line by means of superimposed screens, graphics, measured values, and variable parameters. Step-by-step guidance for operator intervention is provided for the various operating modes (set-up, inching, automatic continuous run). A help system can be called up at any time, if help is needed with the menus.



Control panel with touch screen

Precision and reliability from blank feeding to the minting process

Coin blanks for both horizontal and vertical presses are fed by means of a rotating drum. Feed drums of this design are particularly gentle. Abrasion is minimal as compared to vibrating feed drums; noise generation is also reduced. No change parts are required for changeover to a different blank size. Only blank out-feed width and height have to be adjusted.

Feeding of blanks and take-away of finished coins are performed with great reliability, by means of a dial feed plate with overload protection. The drive is equipped with a backlash-free mechanical indexing gear, which has extremely high indexing accuracy, and with optimal acceleration and deceleration characteristics.

In the case of horizontal presses, the blanks reach the dial feed plate by gravity via the feed channel. In vertical presses, feeding takes place by means of a channel, a feed tube and a pusher. The efficiency of high-speed presses is seriously impaired by off-size blanks. To avoid downtime, Schuler offers a fully automatic blank control and discharge system. If the sensor detects an off-size blank in the control station, the flow of blanks is interrupted by a stop cylinder, the off-size blank is ejected into a collecting tray, the stop cylinder opens, and blank feed continues. Continuous loading is thereby ensured. The process takes only a fraction of a second. The arrangement of the blank control device directly in front of the coining station offers maximum protection.



Blank feeding is gentle on the material



MRH feed drum

Minting presses in horizontal design – MRH range ideal for round coins and high-volume coin production

Horizontal minting presses of the MRH series are employed exclusively for the processing of round blanks. With cycle rates of up to 850 strokes per minute, presses in this series are best suited for large-volume production.

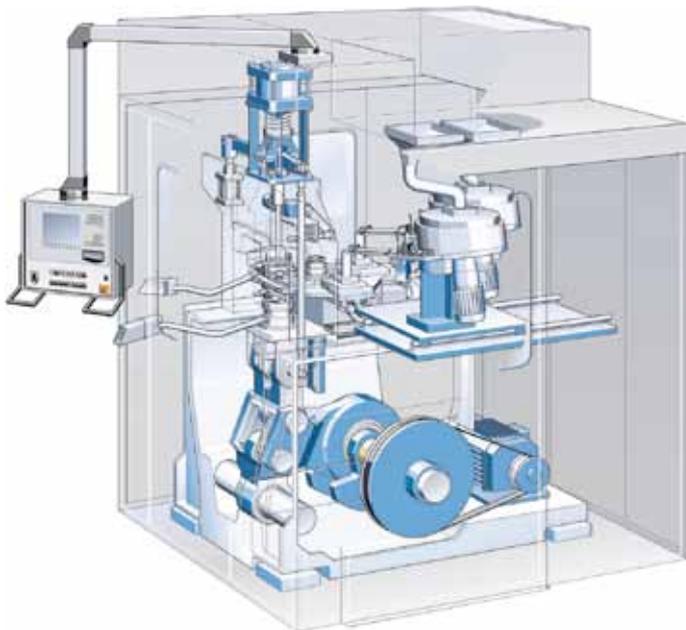
Short changeover times result from the small number of change parts and ensure a high degree of flexibility.



MRH 150 with noise protection system

Minting systems in vertical design – MRV universal application range for round, multi-sided, bi-metal and tri-metal coins

Vertical coining presses of the MRV series are the most versatile in application. These presses were designed to be the basis for “universal coining centers” for the production of all kinds of circulating coins.



Minting press MRV 150

Benefits of the MRH and MRV press series:

- High stroking rates and short cycle times
- Long service life of the coining punch by firm connection of punch and slide
- Link drive with mass counterbalance
- High level of transport reliability from feeding of blanks to ejection of finished coins
- Press mounted on vibration-damping elements, making it possible to install the machine without foundation

Joining and coining in one operating sequence – Schuler bi-metal and tri-metal minting presses

Vertical coining presses are highly versatile. They can be used to manufacture round and multi-sided coins, as well as bi-metal and tri-metal coins. Nominal press capacities of 1500, 2000 and 3000 kN are employed.

For the production of bi-metal and tri-metal coins, joining and coining is completed in one operating sequence. The rings and centers are fed separately and coined at maximum cycle rates.



Feed drums of a bi-metal press



Bi-metal coins

Piercing, joining, coining, and separating – Schuler Ringmaster

In addition to the abovementioned possible applications of a vertical coining press, presses equipped with the Schuler Ringmaster can also be used as piercing and separating presses.

Benefits of the Ringmaster:

- All forms of rim contour and/or edge lettering are possible
- Coins with edge lettering can be processed into bi-metal coins (after corresponding piercing)
- The Schuler piercing tool avoids distortion and guarantees the flatness of the rings
- Fast changeover from coining to piercing operation
- Wide variety of applications ensures high degree of utilization
- Ring manufacture for relatively low investment



MRV 150 Ringmaster



Possible applications of the Schuler MRV 150 Bi-Metal/Ringmaster

Multi-sided coins

Schuler presses can produce multi-sided coins – both as conventional single-metal coins and as bi-metal coins.

Multi-sided bi-metal coins not only look different when compared to the round version, they also offer mints new possibilities with regard to security.

The joining of multi-sided centers and rings also means that new, high-quality designs can be implemented. Multi-sided bi-metal coins are particularly suitable for those coins with high nominal values.

Thanks to a special function developed by Schuler, it is possible to mass produce multi-sided bi-metal coins. The basis for manufacturing multi-sided coins is the MRV 150 vertical coining press with bi-metal equipment and additional technology developed by Schuler.



Multi-sided bi-metal coins



Multi-sided coins

Tri-metal coins

The mass manufacturing of tri-metal coins poses a considerable technical challenge. Tri-metal coins are produced using a vertical coining press MRV 300, fitted with special technology.

The ring and two centers, made from three different materials, are led to the minting tool via three different feeds. Depending on the materials and technical specifications, coins with diameters of up to 50 mm can be minted. Speeds of up to 500 strokes per minute can be reached.



MRV 300 – three feeds for the production of a tri-metal coin



Easily accessible interior of MRV 300

Short changeover times ensure high levels of uptime – Schuler die change

Sound enclosure panels and safety covers on both horizontal and vertical presses can be opened far enough to permit unhindered access to the die space.

For horizontal presses, the feed drum and infeed chute can be swung out to the side after releasing a lock. The indexing gear and dial feed plate are lowered pneumatically for die change.

The whole die change can be completed in three minutes. For vertical presses, the indexing gear and dial feed plate are moved out as a complete unit to permit die change. The feed drum is moved out separately.

The coining pressure can be adjusted while the press is running, either manually or by means of the ABI-Plus control system. The presses are equipped with an inching mode to allow adjustment of the punch after changeover to a new coin.



Die space MRV 150



Feed system MRV 150

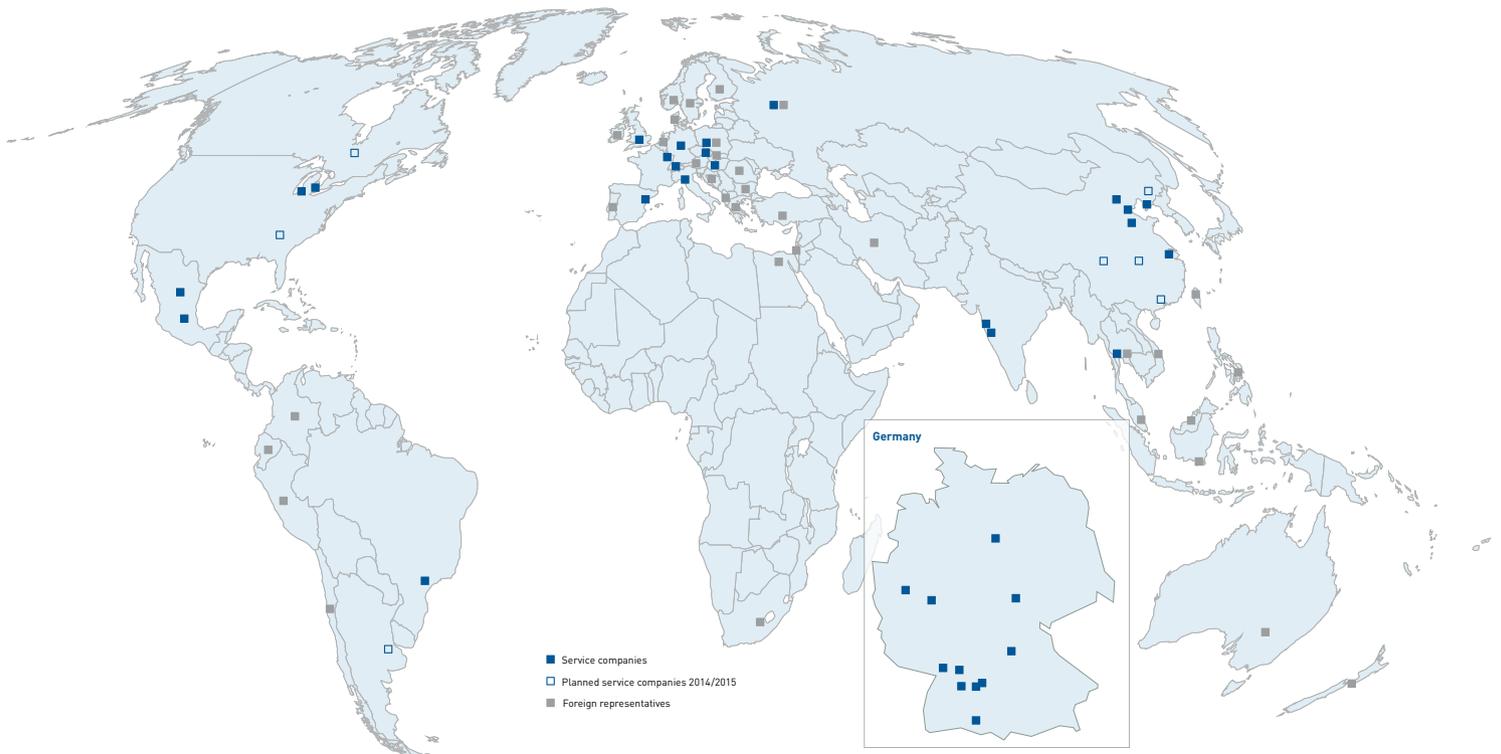
Schuler Service Minting

Schuler stands for outstanding performance and the highest quality. We set the same goal for ourselves in service, too. The five building blocks of productivity, safety, expertise, partnership, and future mean that our unique service offering is precisely tailored to our customers' needs.

Our individually configurable service packages and product-specific expertise benefit our customers, with more than 900 highly qualified service employees worldwide ready to ensure that your production runs smoothly from the beginning. In the final analysis, this adds up to productivity, maximum availability and safety throughout the entire service life of your system.



SCHULER SERVICE COMPANIES WORLDWIDE



Consultation and planning worldwide – Schuler as system partner and as turnkey supplier

Schuler offers more than just minting equipment for the production of coins and medals.

From design to the packaging of finished coins – from the integration of new technologies into the manufacturing process, to the planning and realization of complete projects – Schuler is at your disposal as a system partner and turnkey supplier worldwide.

Schuler as turnkey supplier

As a general planning partner and general contractor, we offer the development and production launch of complete minting facilities. Our services range from planning the process engineering, to project coordination and determining the interfaces, to the integration of components into new equipment concepts.

The Schuler range

Blanks, circulating coins, tooling

Equipment for the production of blanks, circulating coins and tooling

Handling and logistics

Equipment for inspection, counting and packaging of coins; systems for weight data measurement with printers; coin containers; safety devices, and floor-mounted or overhead conveyors

Special edition coins and medallions

Equipment for cleaning and polishing of blanks, and systems for decorative packaging

Minting tools

Support for design of coins, delivery of master tooling, coining punches, and rings

Manufacture of minting tools

Equipment for engraving and manufacture of models, hobbing presses, annealing lines, including testing devices, and PVD coating systems for longer service life of the coining punches (TiN, CrN, AlTiN, and TiCN)

Research, development and training

At the testing and demonstration center in Goepfingen, Schuler provides its complete product range for demonstration purposes as well as for conducting test runs. Experts offer training on all aspects of minting technology according to customer needs.

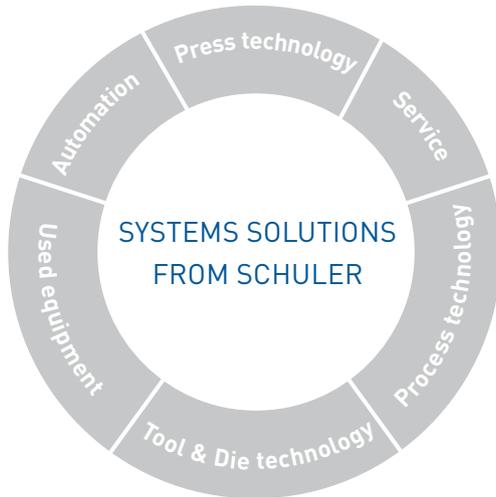


Schuler – a comprehensive range of products

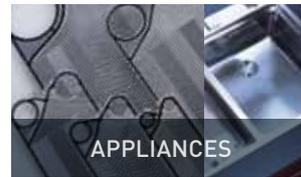
Six components of our success. As varied as the demands of our customers.

Schuler is a reliable partner that supports you completely and globally. We do this with a comprehensive range of solutions focused on market drivers, with a sophisticated product range and innovative technologies.

A comprehensive package



Serving many segments



Eight technology fields for innovative systems solutions



- **Automation Technology:** automation of single press systems and press lines, blanking lines, laser systems
- **Automotive Press Technology:** mechanical single press systems, press lines, tryout presses, lightweight technologies
- **Forging Technology:** systems for cold, warm and hot forging, engineering of processes and dies
- **High-Speed Technology:** systems for the packaging industry, solutions for manufacturing electric motor laminations, minting technology
- **Stamping & Cutting Technology:** C-frame presses, stamping presses, servo presses, knuckle-joint presses, link drive presses, process support, and consulting
- **Hydraulic Press Technology:** single press systems, press lines, spotting and tryout presses, systems solutions for press hardening, hydroforming, forming of fiber-reinforced plastics, fine blanking presses
- **Tool & Die Technologie:** engineering, body dies/ multi-stage tools, production of parts
- **Schuler Service:** technical service, performance enhancement, trainings, used equipment



SCHULER PRESSEN GMBH

Bahnhofstr. 41 | 73033 Göppingen | Germany
Phone +49 716166-0 | Fax +49 7161 66-233

info@schulergroup.com | www.schulergroup.com