



Customized Heat Treatment Systems for **Aluminum**

定制化铝合金
热处理系统

schwartz heat treatment systems – as unique as your production line

施瓦茨热处理设备 —— 为您的生产线量身定制



schwartz heat treatment systems tailored to your production needs

为您的生产需求量身定制的施瓦茨热处理系统

Ever since schwartz was founded in 1984, we have been developing heat treatment systems tailored to our customers' specific production requirements along with the associated handling equipment.

Our specialty heat treatment systems for aluminum applications are being successfully deployed primarily in the automotive industry (OEMs), its supplier segments (tiers 1 & 2), the aircraft industry and the construction industry. Our product portfolio comprises chamber furnaces, pit furnaces, continuous furnaces, elevator furnaces, roller-hearth furnaces, and vertical furnace systems. Whatever your processing needs – rolled products, extrusions, forgings or castings – we will manufacture the right heat treatment solution for your company.

We custom-design, manufacture, and efficiently integrate all our systems into production lines the world over. From the earliest enquiry phase we take into account your specific production conditions in providing sound and competent advice. What's more, the deployment of all our proven modules is consistently aligned to your specific requirements.

自1984年施瓦茨成立以来，我们一直根据客户的各种特定需求开发热处理系统及相关其他处理设备。

我们专业用铝合金热处理系统，已成功应用于汽车制造业（主机厂）及其供应商（1级、2级）和钢铁、建筑等行业。产品系列包括箱式炉、井式炉、连续炉、开底炉、辊底炉以及竖式炉等系统。无论您需要工艺轧制产品，挤压制品，锻压或者是压铸产品-我们都可以为您提供解决方案！

我们定制设计、建造并在全球范围内的客户端有效地整合应用我们的系统。从初次询价开始，我们就会在提供合理有效建议时充分考虑到您的特定生产条件。此外，我们会针对您特定的需求不断调整所有经过实践考验的模块。



Innovation based on vast experience

经验丰富，创新为本

At our in-house Technology Center we operate a modern testing facility. This allows the key advantages of high convection technology to be determined for any part or sheet metal and demonstrated in practice to customers or prospective users.

To maintain our ability to fulfill our customers' high quality and innovativeness demands, we place special emphasis on regular further training for our staff. As a result, our experienced engineers and technicians are characterized by their state-of-the-art technological expertise.

At the same time, working with a customer in a partnering spirit is always our key priority. From the first enquiry through system development, delivery and commissioning to competent all-round after-sales support, we will serve as your competent and reliable partner anywhere in the world.

通过公司内部技术中心所采用的现代化测试设备的演示，我们可将高对流技术在任何零部件或者金属板材处理上的绝对优势证明给客户或潜在客户。

为了确保能够满足客户的高品质和创新需求，我们特别重视定期对员工进行深入培训。因此，我们经验丰富的工程师和技术人员都有着先进的技术专长。

同时，秉持合作伙伴的精神与客户合作，是我们的首要目标。从初次询价到系统开发、交付和调试至全方位售后服务，我们都是您在全球范围内可信赖的优质合作伙伴。

Your productive benefits: Heat treatment systems for aluminum made by schwartz

您的生产效益：施瓦茨铝合金热处理系统



International standards

国际标准

Automotive manufacturing today is characterized by a focus on vehicle lightweighting and on reducing energy consumption and CO₂ emissions. In line with this trend, the share of aluminum castings and forgings in cars nowadays is steadily increasing. Our heat treatment systems for aluminum address this development in that they conform to both SAE AMS 2750 and CQI-9 Heat Treat System Assessment specifications.

为了顺应汽车制造轻量化及节能减排的发展趋势，如今车身铝质铸件和锻件的使用逐步增长。且顺应此发展趋势，我们的铝合金热处理系统同时符合SAE AMS 2750以及CQI-9的评估规范。



Factory Acceptance Test

工厂验收试验

All schwartz heat treatment systems are fully assembled and undergo thorough pre-shipment hot testing at our German manufacturing sites in Simmerath and Aachen or in Kunshan, China, for the Asia-Pacific region. We heat up the finished system under real-life operating conditions to check key parameters. Some initial fine-tuning is undertaken during the Factory Acceptance Test (FAT) to speed up installation at your site.

If required, you can join us in conducting this FAT so you can be certain your system is fully functional before it leaves our premises. Thanks to our highly professional trained staff the subsequent installation and commissioning at your production site will be carried out successfully anywhere in the world in the shortest possible time.

所有由位于德国锡默拉特，亚琛及服务于亚太市场的中国昆山工厂生产的热处理系统均整车装配、运输之前经过事先预热，并且通过初步试车测试。我们在实际工作条件下对已完成的热处理系统进行加热升温，从而检查关键性的参数。且在工厂验收的同时（FAT）完成初始微调，以缩短在您工厂的安装时间。

您也可以参与我们的工厂验收，以确认您的系统在出货前运行正常。得益于我们训练有素的员工，无论您在何处，我们都能保证您的热处理系统可在最短时间内完成后期安装和系统调试。



Worldwide service

全球服务

Even after your system has been commissioned, our professional customer service team will always be at hand to provide any assistance you may need. Whether it's periodic maintenance, installation of spare parts, operator training or support with temperature uniformity (TUS) and system accuracy (SAT) monitoring, we will remain your reliable partner throughout the long lifecycle of your schwartz heat treatment system.

对已完成安装调试的设备，我们专业的客户服务团队仍可随时为您提供您所需的任何帮助。无论是定期维护、备件安装、操作员培训还是温度均匀性（TUS）支持以及系统精度（SAT）监控，在您施瓦茨热处理系统整个运行生命周期内我们始终都是您可靠的合作伙伴。

Jet heating – effective heat treatment for aluminum parts of diverse geometries

喷流式加热 —— 不同形状铝合金件的有效热处理



Our jet heating technology provides efficient heating via high-convection recirculated air, flue gas or protective atmosphere. The gases are uniformly applied at high velocity to the aluminum parts by an array of product-specific nozzles. The optimum nozzle-to-product distance ensures a maximum heat transfer coefficient that is many times higher than with conventional forced air circulation – and thus reduces the heat-up time accordingly.

The parts can be placed side by side across the overall furnace width. For parts of varying height and geometries a nozzle array with motorized adjustment can be used to set the ideal nozzle-to-product distance. Our conveyor systems, e.g. chain conveyors for billets or slat conveyors with V-shaped supports for discs and billets, are custom-designed to match your specific product range and part geometries.

Our jet heating systems can be designed for heating aluminum parts to forging temperature or for solution annealing with an appropriate soak zone. The throughput capacity of our furnace systems typically ranges from 500 to 5,000 kg/h.

使用喷流式加热方式，通过空气循环、流动气体或保护气氛的强对流提供有效加热。通过适用于产品的喷嘴阵列，高速、均匀地将气体喷射于铝件上。由于喷嘴与产品间的理想间距，达到最大传热系数，相比传统的热风循环高出数倍，并且可以减少相应的加热时间。

工件可以挨次摆放在炉子宽度范围内。如果部件高度和几何形状不同，可以电动调整喷嘴阵列的高度，设置喷嘴与产品间的理想间距。我们的传送系统，包括铝锭链式传送带或圆盘和坯料的V型支撑板条传送带，都可根据您产品的范围和部件几何形状进行设计调整。

我们的喷流式加热系统用于将铝合金工件加热至锻造温度或者用于铝合金工件带有适当保温时间的直接固溶退火。炉子系统的标准产能大约在500至5000kg/h之间。

Jet rotation heating – reliably uniform heating of aluminum coils

喷流式旋转加热 —— 铝带卷均匀可靠的加热



Jet rotation heating combines jet heating with a rotation of the nozzle bank. We specifically developed this patented system for the uniform heating of aluminum strip coils.

The tubular nozzle array uniformly heats up the coil in a protective atmosphere and the perpendicular jet impingement ensures optimum heat transfer. Automatic width adjustment of the tubular nozzle bank minimizes heat-up times even where coil widths vary. The high heat-transfer coefficient (approx. 4 times higher than with conventional heating methods) is achieved through the optimized coil-to-nozzle distance.

Rotary heat transfer to the coil surface prevents surface markings that would otherwise occur as a result of local heating of critical alloys, e.g. those of high magnesium content.

喷流式旋转加热将喷流式加热和喷嘴箱的旋转合二为一。我们开发该专利系统，以均匀加热铝带卷。

通过垂直喷射气流，在最佳的传热条件下，涡流喷嘴阵列均匀加热带卷。管状涡流喷嘴箱可自动调整宽度，确保带卷宽度不同时较短的加热时间。得益于带卷到喷嘴的最佳间距，才可达到高传热系数（比传统加热高出约4倍）。

旋转传热至带卷表面，以免在均质化温度时在带材表面形成暗纹，这种暗纹通常产生于给合金加热时，比如镁含量比较高的合金。

Our product range offers you a wide choice ranging from a single-coil furnace to chamber furnaces accommodating five coils in a row.

For uniform product cooling the jet heating system is equipped with a protective-gas-to-water heat exchanger. In the furnace thin strip coils are supported on their spools, while heavier-gauge strip coils are held on V-supports or troughs. The coils are loaded into the furnace by a traversing charging machine with lifting arms.

我们的产品范围可以为您提供各种选择，从单带卷炉子到一排能够容纳五个带卷的箱式炉均可。

对产品进行均匀降温时，这一喷流式加热系统会配备保护气体和水换热器。在炉内，带有卷轴的薄带卷直接放置在炉子里，更重的带卷使用V型支撑或者托盘。这些带卷通过配有提升臂的横行式装料机装入炉内。



Scan the QR code to see the film about our heat treatment systems for aluminum.

请扫码观看我们热冲压热处理系统的宣传片。

Batch-type and roller-hearth furnaces for highly efficient heat treatment of aluminum tubes, rods and sections

用于铝合金管材、棒材和型材的高效批处理式热处理炉和辊底式热处理炉



schwartz chamber furnaces can heat aluminum products of any geometry – anything from bulk parts in transport containers, ingots or billets to aluminum components arranged on trays.

Powerful recirculation of fan-driven hot air or flue gas ensures dependably uniform heat transfer. The atmosphere flow is controlled individually to match the product arrangement in the furnace or on the trays. Chamber furnaces are loaded by means of a bogie or by placing the loads on trays.

In our roller-hearth furnace for solution annealing applications the aluminum rods and profiles are fed side by side into the heating chamber on rollers. Heat treatment is carried out by high convection with the product resting on an oscillating roller track. Upon completion of the annealing process the product is immediately fed into the high-pressure and low-pressure water quench and then dried.

In the heat treatment of rods and profiles, this furnace design

has proven its merits many times over, delivering excellent straightness of the quenched product.

施瓦茨箱式炉可加热任何几何形状的铝合金产品，从放置于传送料架上的铝锭或铝棒产品或者是放置在托盘上的铝合金部件。

通过由风机驱动的强气流循环热空气或者流动气体加热产品，以确保均匀地热传递。炉内气氛流动可以控制以适配于产品在炉子内或者托盘上的摆放。使用小车或托盘对箱式炉进行加料。

在铝棒和铝型材固溶退火的辊道中，产品挨个放置在传送辊道上的适当位置，送入箱式炉中加热。产品放置在具备间歇振动功能的炉底辊道上，强气流进行热处理。退火过程完成后，产品被迅速送入下游高压和低压水淬中，然后进行干燥。

这款熔炉的设计已证明其对棒材和型材热处理的优点；对于淬火产品的平直度，成效显著。

Elevator furnace – the space-saving alternative to a chamber furnace

开底炉 —— 节省空间的、箱式炉的备选



schwartz elevator furnaces are a space-saving alternative to chamber furnaces. The loads of thin-walled aluminum sheet metal or castings are lifted into the furnace by an integrated lifting device and then locked in place.

Once the furnace bottom is closed, the mostly electric-powered heat treatment process begins. Upon completion of the heat treatment cycle, a quench tank mounted on a mobile floor carriage can be moved under the furnace, allowing the aluminum load to be quenched in 7–13 seconds depending on product type. This tank is equipped with recirculating pump plus cooling and process heating equipment.

This elevator furnace design also supports T6 heat treatment, which combines solution annealing with subsequent quenching and artificial ageing of the product.

施瓦茨开底炉是节省空间的、箱式炉的备选。铝合金工件（薄壁金属板或者铝铸件）从下举升至炉内，随后关闭自锁。

一旦炉底关闭，气体或电加热启动热处理程序。淬火槽放置在可移动的落地架上，在热处理后，可在炉底移动，根据产品的类别，铝合金工件可在 7-13 秒后在水槽内淬火。淬火槽装备有循环泵和冷却加热设备。

这款炉子的设计亦支持 T6 热处理，包括后续淬火和产品人工失效的固溶退火。

Pusher furnaces – a compact footprint even in artificial ageing of forgings

连续推进炉 —— 可用于锻件人工失效时的紧凑型设备



In addition to continuous conveyor furnaces, we also offer indexing pusher furnaces for artificial ageing of forgings. These systems additionally ensure fast and uniform heating, a quick return of parts into the processing workflow and, above all, require substantially less space.

除了连续传送炉，我们还可提供适用于锻件人工失效的步进式推进炉，用于实现零部件的快速均匀加热并快速返回 workflow，尤其可大大节省空间。



In a pusher furnace the product is placed in racks and heated by a high-intensity recirculating airflow. Hydraulic pushers advance the racks through the heating chamber on skid rails in line with the pushing cycle set. The loaded racks are fed into the furnace and discharged at the exit end by motor-operated chain transmission elevators. More space can be saved by placing the air-cooling zone underneath the furnace chamber.

在连续推进炉中，产品放置在料架上，通过高强度循环气流进行加热。随着推进节奏，液压推杆推动料架通过炉底轨道上的箱式加热区域。这些装好的料架被送入炉内，由电动链式升降机在出料口末端移出。空气冷却区置于炉腔下方，节省了很多空间。

Selected references

主要客户



BHARAT FORGE



A growing number of renowned customers all over the world trust our product quality and high standards. As your dependable partner for innovative heat treatment systems for aluminum, you can count on us to develop a made-to-measure system to suit your operational needs, and to offer a service that is precisely tailored to your requirements.

全球越来越多的知名客户信赖我们的产品质量和高标准。作为您创新型铝合金热处理系统的可靠合作伙伴，我们可为您量身定制满足您特定需求的系统及服务。





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