



## CSM expands nickel alloy range for one-stop solutions

As one of China's earliest special materials suppliers to enter the international market, CSM has been deeply involved in the industry for nearly three decades. Today, it has a strong brand and is widely recognised as a provider of speciality materials and engineering solutions, supplying high-end speciality materials such as titanium, nickel, and stainless steel. Recently, CSM has intensified its focus on the nickel alloy sector, utilising advanced smelting and forging techniques, strong customisation capabilities for special grades, and flexible full-service one-stop solutions to consistently deliver enhanced efficiency and exceptional value to customers around the globe.

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When it comes to special materials suppliers in China, CSM (full name: CSM-TECH. CO., LTD.) undoubtedly stands out as a leading brand. In the field of titanium materials, CSM has established a complete production system ranging from titanium sponge smelting to finished product inspection,

delivering high-quality titanium products for high-end applications across various industries. In the stainless steel sector, leveraging over two decades of production experience, CSM has developed a diverse range of products with outstanding performance, making it the preferred choice for

demanding environments. This article, however, will primarily focus on CSM's remarkable achievements in the nickel alloy sector. After nearly two decades of technological dedication, CSM has made a leap from small-batch trial production to large-scale manufacturing, emerging as one of the

most comprehensive suppliers of nickel alloys in the industry. It efficiently meets diverse customisation needs, winning recognition from leading firms and a wider customer base.

### Technology leadership

In the field of special materials, nickel alloys have emerged as a pivotal material due to their unique properties. Compared to titanium and stainless steel, the smelting process for nickel alloys is far more complex, requiring stringent technical controls where even slight variations in trace element ratios can significantly affect material quality and performance. As a supplier dedicated to high-end and harsh-condition applications in the special materials sector, CSM recognises that smelting is the core of nickel alloy production. Leveraging its expert-led team and cutting-edge smelting facilities, CSM has carved out a distinctive development path. CSM's competitive edge stems from a

veteran expert regarded as a titan in the nickel alloy industry. As a graduate of the inaugural class (1963) of Shanghai Jiao Tong University's vacuum smelting program - a specialised five-cohort initiative for national defence talent - he began his career at the Naval Materials Research Institute, where he played a pivotal role in the entire lifecycle of nickel alloy (especially in Monel) development, from R&D to production, amassing unparalleled practical experience. Later, at the Shanghai Materials Research Institute and Shanghai Jiao Tong University, he deepened his research expertise. Post-retirement, he founded a dedicated institute to tackle challenging alloy grades. The experts' global technical exchanges with leading nickel alloy manufacturers and repeated international retention offers underscore his international recognition.

Beyond his mastery of smelting techniques, the expert possesses extensive familiarity with diverse nickel alloy materials, enabling him to precisely resolve both routine production issues and complex technical hurdles through his profound understanding of material characteristics, performance, and applications.

Under his leadership, the technical team, which includes 12 PhDs and masters from top-tier institutions, is a formidable force for innovation and problem solving. Beyond technical prowess, CSM prioritises professional expertise across all departments,

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with materials specialists dominating key roles in R&D, sales, and more. Team stability further strengthens CSM's foundation, as half of its employees have over a decade of tenure, including several with nearly 2 decades of experience - seasoned professionals who ensure reliability in challenging scenarios. Meanwhile, the company embraces youthful energy, with Gen Z and millennials accounting for one-third of the workforce, injecting fresh perspectives. This balanced blend of experience and innovation positions CSM for sustained leadership in the materials sector.

For nickel alloy production, smelting is the cornerstone of quality. Guided by their in-house expertise, CSM has invested in a state-of-the-art smelting and forging production base, tightly controlling these two critical front-end processes.

CSM's quality control permeates every stage: pre-smelting checks include element ratio verification and raw material inspection (e.g., cleaning components to military-grade cleanliness before furnace loading);



The veteran expert providing guidance to technicians.

**CSM classic project showcase****Case 1: Export project of 690 alloy tubing**

In 2012, CSM secured a 200-ton order for 690 alloy tubing, with a single contract value exceeding USD 10 million, marking the largest export deal in China's specialty materials industry at the time.

**Case 2: Technical breakthrough in Hastelloy B2 alloy tubing**

That same year, CSM undertook and successfully delivered an order for Hastelloy B2 tubular products, achieving China's first-ever successful export of B2 alloy tubing.

during smelting, parameters such as heating rates are rigorously monitored to prevent defects, such as porosity. All operators adhere to CSM's standardised protocols.

The smelting process not only ensures product excellence but also optimises costs. Through process refinement and technological innovation, CSM delivers nickel alloys that meet stringent requirements while reducing production costs, distinguishing itself in a competitive market and demonstrating robust corporate strength.

**Breaking boundaries, meeting specialised needs**

In the traditional industrial landscape, conventional enterprises, constrained by fixed-furnace technologies, often struggle to innovate in nickel alloy products or to create customer value. CSM breaks new ground by leveraging



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its extensive experience and robust production capabilities to develop specialised nickel alloy grades and enable flexible mass production. This approach allows it to secure high-barrier, small-batch customised orders, meeting individualised customer needs and establishing a dominant position in niche markets. Its customisation capabilities not only drive efficient translation of technological advancements into practical applications but also highlight exceptional process flexibility and product uniqueness. CSM also demonstrates precise strategic focus in equipment investment: targeting the high-end market, it avoids indiscriminate

large-scale expansion and instead strategically deploys a cluster of precision smelting equipment, including 3-ton VIM, 6-ton ESR, and 3-ton VAR furnaces, paired with a 3,500-ton forging system. This technical matrix stems from the team's profound expertise - smaller furnaces better align with premium material composition and alloy uniformity requirements, ensuring superior product quality and stability. By co-investing in smelting base construction, CSM maintains full control over production technologies and quality, rigorously managing critical processes like element ratios, thereby emerging as a disruptor in the nickel alloy sector. Through in-depth customer engagement, CSM precisely captures technical requirements and integrates them into trial production and multi-stage testing, conducting R&D strictly per client specifications. Upon meeting performance benchmarks, it promptly provides detailed reports and samples for customer validation, securing small-batch trial orders. This meticulous early-stage process, demanding high product stability, adheres to a steady progression principle, ensuring reliability before scaling to mass production. Meanwhile, CSM prioritises cost control and yield optimisation to maximise efficiency.

In customisation, CSM boasts unmatched experience and capabilities. Beyond mastering conventional grade production, it actively pioneers specialised grades,



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offering a far broader product range and grade portfolio than peers. This technology-driven customisation model for innovation holds profound significance: it not only secures CSM's strategic edge in high-end materials but also propels the entire industrial chain toward high-value domains through continuous technological upgrades and cost refinements, delivering a distinctive Chinese solution to global manufacturing.

**One-stop solutions for a seamless customer experience**

As a pioneer in the special materials sector, CSM boasts deep expertise and technical prowess in nickel alloys and other high-performance materials, earning widespread market recognition over the years. However, amid evolving market dynamics and increasingly diversified customer demands, merely supplying nickel alloy materials no longer meets clients' needs for competitive added value. CSM astutely identified a prevalent pain point across industrial sectors such as heat exchanger manufacturing, chemical plants, and power generation: fragmented product-system integration, coupled with a vast array of dispersed components, complicates procurement processes and reduces efficiency. This challenge is particularly acute for nickel alloys, where varying demand scales often leave traditional services inadequately equipped.

Leveraging its deep industry insights and extensive service experience,

CSM successfully transformed from a special materials supplier into a holistic engineering solutions provider, excelling in one-stop packaged services for special materials. This strategic shift not only aligns with market demands but also reflects the value realisation of CSM's accumulated capabilities. While numerous material suppliers eye this market gap, few possess the competence to deliver high-quality, integrated nickel alloy solutions.

Backed by its robust technical foundation, stringent unified quality control systems, mature supply chain networks, cutting-edge solutions, and proven service track record, CSM has honed a distinctive one-stop nickel alloy packaged service model. This model spans foundational materials such as nickel alloy tubing and bars, and extends to a broad range of products, including tubesheets, flanges, pipeline fittings, and valves. Compared to traditional procurement approaches, CSM's solution offers greater efficiency and cost-effectiveness. As a nickel alloy expert, CSM not only precisely supplies all required materials but also undertakes welding and assembly of pipes, fittings, and flanges per client specifications, dramatically streamlining procurement and construction for new projects. This unique one-stop capability sets CSM apart in the nickel alloy sector, delivering unprecedented convenience to clients. With its integrated service strengths, CSM is actively empowering

**"CSM excels in one-stop packaged services for special materials."**

more customers with streamlined, reliable, and high-efficiency engineering solutions.

**Delivering reliable service for global industry**

Despite achieving remarkable success over its years of development, the CSM team has never acted rashly. Instead, they have remained steadfastly focused on the R&D and application of special materials, primarily titanium, nickel, and stainless steel. While maintaining a certain breadth in their operations, they emphasise meticulous precision and continuous improvement to enhance product quality and competitiveness. Currently, CSM's business is primarily concentrated in industries with high demand for special materials, such as oil & gas, chemicals, and power generation. In these sectors, CSM has earned widespread trust from clients through its exceptional product quality and reliable supply capabilities. Meanwhile, the company is actively expanding into high-standard industries like aviation and deep-sea exploration, striving to demonstrate its technological edge and showcase the capabilities of China's leading speciality materials supplier, thereby advancing its vision of empowering global industry.

When asked about CSM's core strengths, Ms. Helen Cao, General Manager of CSM, stated: "Customers choose CSM because we deliver unique value. Our advantages are multifaceted. First: expertise. With 26 years of deep industry experience and numerous projects under our belt, we've accumulated unparalleled know-how. Second: supply chain integration and on-time delivery. We provide tailored, end-to-end solutions - from material selection to processing and logistics - ensuring on-time, high-quality delivery. Third: quality control. Our rigorous systems guarantee every batch meets stringent standards. Fourth: integrity. We communicate transparently, uphold accountability, and prioritise honesty. This unwavering commitment to integrity anchors our quality-first philosophy, enabling us to consistently deliver exceptional service and create greater value for our clients."▲