

Bangde presents research on the synergy of materials and heat treatment to improve the wear resistance of clamping plate



Jinan, Shandong Sheng Apr 8, 2026 ([Issuewire.com](https://www.issuewire.com)) - Bangde Heavy Industry Technology Co., Ltd., a leading integrated mechanical engineering company, presented a comprehensive study on wear resistance factors in critical crushing equipment components. The study focused on jaw plates, the durability of which directly determines the efficiency of mining and construction operations.

The study emphasizes that wear resistance is not a static material property, but is formed as a result of the complex interaction of the alloy's chemical composition, thermal strengthening conditions, and dynamic operating conditions.

Analysis of Factors Affecting Component Wear

The process of surface failure of jaw plates in jaw crushers is multifactorial. Bangde Heavy Industry specialists identify three dominant aspects that must be considered in the design and manufacture of components:

Intensity and nature of impact loads: When processing high-strength rocks (such as granite or basalt), components are subjected to cyclic impact loads. High-manganese steel performs best under these conditions. Impacts cause changes in the material's crystal lattice, leading to surface work hardening, while the interior of the part maintains its ductility, preventing brittle fracture.

Abrasive Hardness of the Material Being Processed: The hardness of the rock being crushed determines the speed of micro-cutting of the plate surface. To minimize wear, a certain threshold of hardness must be achieved in the working layer. This requires the precise selection of alloying elements such as chromium, molybdenum, and nickel, which form hard carbides during heat treatment.

Dimensions and Kinematics of Crushing Equipment: Large equipment creates significantly higher specific pressures in the crushing chamber. Such machines require materials with a higher yield strength. A mismatch between the material strength and the scale of the equipment leads to plastic deformation ("yield") of the plates, which disrupts the geometry of the crushing chamber and reduces productivity.

Technological Methods for Improving Wear Resistance

In modern metallurgical practice, several key areas stand out for significantly extending the service life of wear parts.

Use of Composite and Bimetallic Structures

One of the most effective methods is the creation of composite plates. This technology combines properties rarely found in a single monolithic alloy: extreme hardness and high impact toughness.

Steel-Cast Iron Composite: Using high-manganese steel as a base and high-chromium cast iron as inserts. The cast iron provides abrasion resistance, while the steel matrix holds the inserts and absorbs impact energy.

Bimetallic Castings: A sequential pouring or explosion welding technology that creates a permanent bond between two layers with different physical and chemical properties.

Surface Hardening and Microstructure Modification

In addition to bulk hardening, methods for localized hardening of areas subject to the greatest wear are used:

Laser cladding: A modern method of applying wear-resistant powders using a laser beam. It ensures minimal mixing of the deposited material with the base material and ultra-high adhesion.

Wear-resistant weld layer: Application of specialized electrodes in a riveting and welding shop for surface restoration or preventative protection.

Chemothermal treatment: Modification of the surface layer composition through diffusion saturation with elements that increase microhardness.

Geometric and structural optimization

Bangde Heavy Industry's design bureau optimizes the tooth profile and plate thickness distribution. Proper metal mass distribution helps compensate for uneven wear, which is typically concentrated in the lower part of the crushing chamber. Shape optimization allows the material to move more efficiently downward, reducing friction time against the surface.

Production Capacities and Process Chain

Implementing high-tech solutions for wear-resistant materials is only possible with a complete production chain. Bangde Heavy Industry's plant infrastructure is designed as a closed-loop ecosystem, encompassing all stages—from raw material smelting to finishing.

Foundry Shop and Melting Facilities: The plant is equipped with a high-capacity melting unit, including two 15-ton and two 3-ton electric furnaces. This enables the production of complex castings with precise chemical composition. The maximum casting processing capacity reaches 80 tons, which covers the needs of the largest crushing equipment models.

Machining and Assembly: The company's equipment fleet comprises 121 units, including:

36 sets of intelligent foundry equipment;

59 sets of equipment

Riveting and welding equipment;

26 sets of precision machining equipment. Crane systems with lifting capacities of up to 100 tons are used for handling and positioning ultra-heavy parts.

Research and Development Facilities and Control. The complex includes a separate building for research and development (R&D). New alloys are tested here, and the macrostructure of metals is analyzed after various heat treatments. An on-site thermal power plant ensures the company's energy independence and stable production processes, which is critical for maintaining temperature schedules for steel quenching and tempering.

A Comprehensive Approach to Service

Bangde Heavy Industry Technology Co., Ltd.'s activities go beyond simply manufacturing spare parts. The company provides comprehensive services covering the customer's entire production line:

Design and manufacture of primary loading ladles.

Development of raw material feeding and transportation systems.

Manufacture of crushing and grinding equipment.

Material screening and classification technologies.

Dewatering systems for sludge processing and ore beneficiation.

Integrating all production stages within a single facility in China eliminates logistical risks and guarantees the identical properties of each batch of products. Control from melting to delivery ensures that finished products comply with international quality standards and heavy industry requirements.

For additional technical information on the company's materials and services, as well as to view the full equipment catalog, please visit the official website: <https://www.bangde.ru/>



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