Scientific line:

Digitalization and AI in forging

Title: Digitalization and AI Empowerment in Forging Production Lines

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Dr. Jun Yu is the Vice President and Senior Research Engineer of Wuhan Newwish Technology Co., Ltd. He receives a Ph.D. from Huazhong University of Science and Technology (2014) and specializes in the development of control systems for servo presses and CNC hydraulic press brakes. With expertise in PC-based open CNC systems, real-time industrial control, multi-unit synchronous drive systems and digitalization, he has led multiple national-level research projects and played a key role in developing advanced forging equipment and automatic forging production line, including direct-drive CNC electric screw presses and servo hydraulic forging presses.Now he is focusing on AI application research in the forging Industry.

Abstract:

Digitization and AI new technologies will profoundly change the future pattern of the forging industry, which is an irreversible development trend.

1. Digitalization in Forging Production Lines: Data is the foundation

By incorporating machine vision systems, multiple sensor devices and digital twin technologies—monitoring billet temperature, dimensions, and morphology in real time—we have digitized our production process. This digital infrastructure allows for continuous monitoring and adjustment, ensuring that each forged component meets stringent quality standards. The data collected not only drives immediate quality improvements but also informs long-term process optimization. Through these innovations, we have significantly reduced material waste, minimized downtime, and enhanced overall production efficiency.

2. AI-Powered Optimization:model fine-tuning, process parameters optimization, predictive maintenance

Looking ahead, we are dedicated to pushing the boundaries of forging technology by integrating artificial intelligence and other cutting-edge methods. Fine-tuning pre-trained AI models (e.g., DeepSeek R1) with domain-specific forging data enhances the ability.AI algorithms dynamically adjust forging cycles based on sensor data.Machine vision systems detect forging dimensions and surface defects during forging, triggering immediate parameter corrections to ensure dimensional accuracy and quality.AI analyzes equipment vibration, thermal patterns, and historical failure data to predict downtime risks in automated forging lines.The above technologies have been integrated into alocalized platform software.

Finally, the report will show some practical application cases and effects about digitization and AI new technologies.This integration of digitalization and AI is transforming forging industry into a high-precision, low-waste, and sustainable future.