



安徽科技学院

ANHUI SCIENCE AND TECHNOLOGY UNIVERSITY



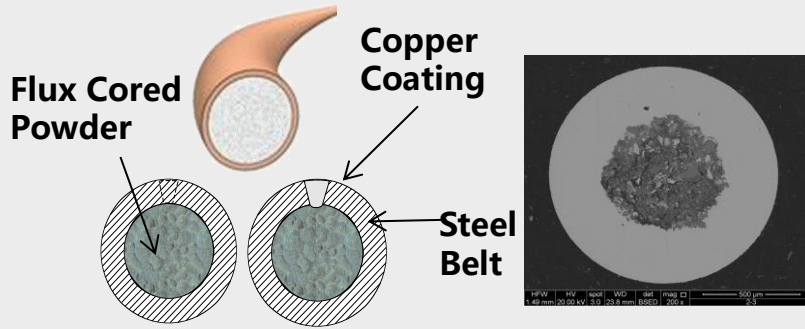
Research and Application of Seamless Flux-Cored Wires for Robotic Welding

Anhui Science and Technology University

Products and Technologies

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Seamless Flux Cored Wire



Greatly improved control of diffusible Hydrogen;

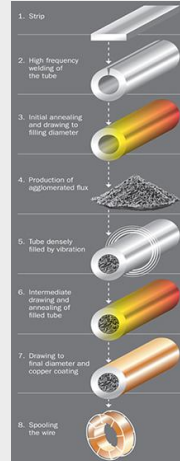
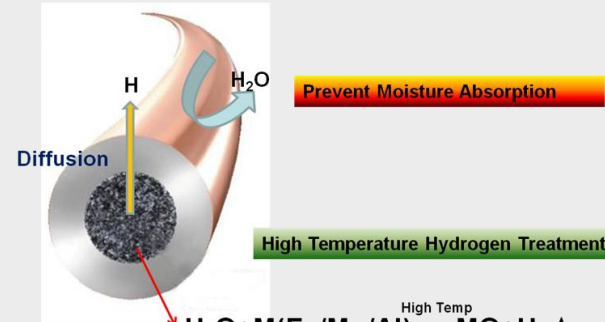
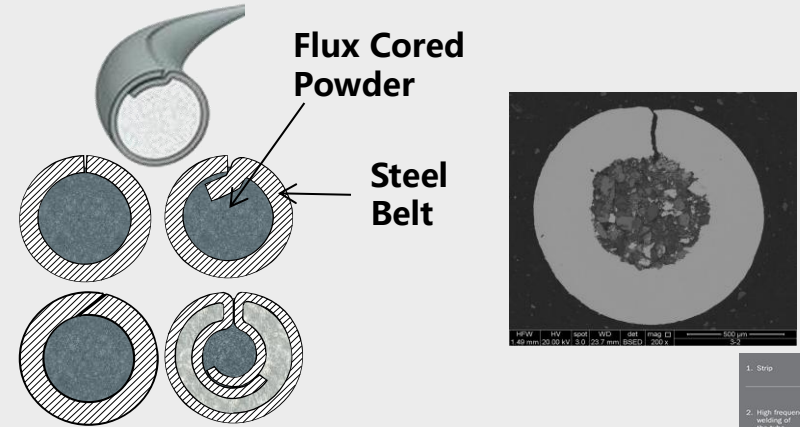
Excellent feedability and improved targetability;

Excellent electrical conductivity;

Greatly reduced moisture absorption;

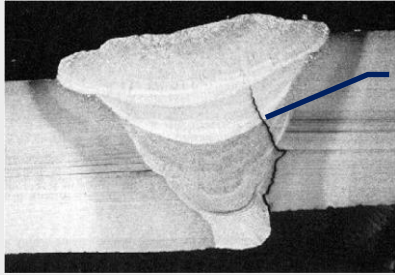
Filling rate is stable.

Seamed Flux Cored Wire

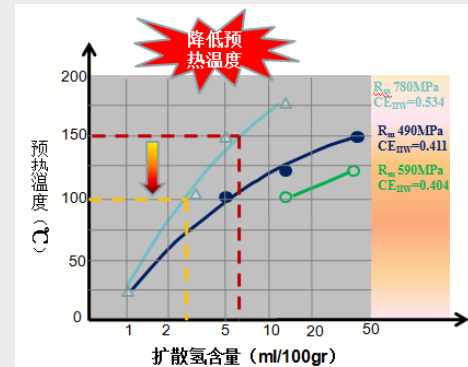
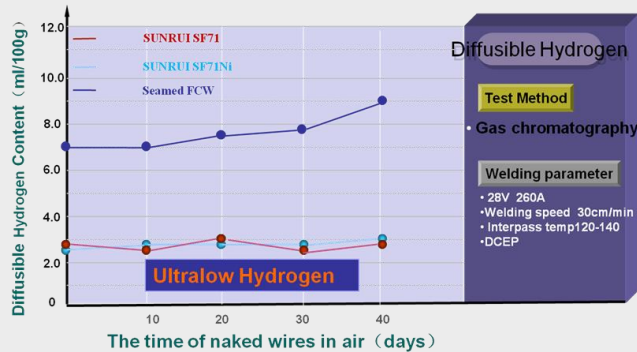
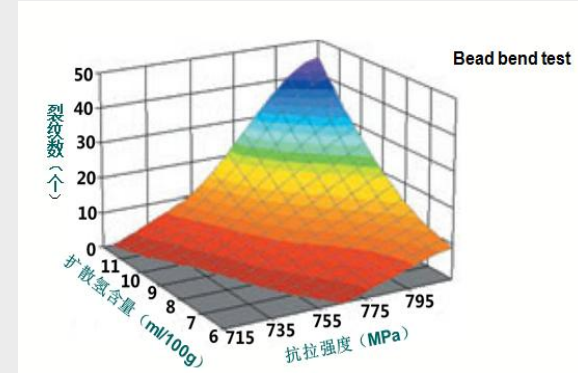
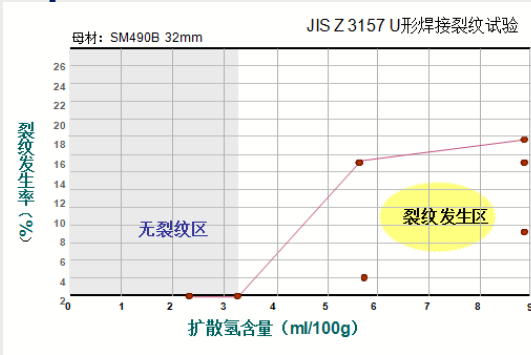


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1 Ultra-low diffusible hydrogen content, reducing cold cracking susceptibility by up to 60% and allowing lower preheat temperatures



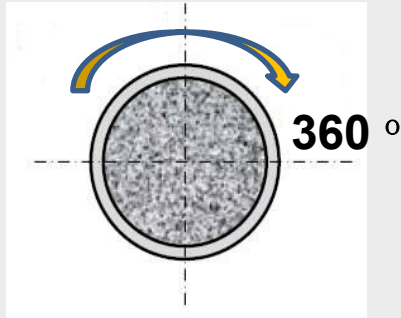
hydrogen-induced cold cracking (HICC)



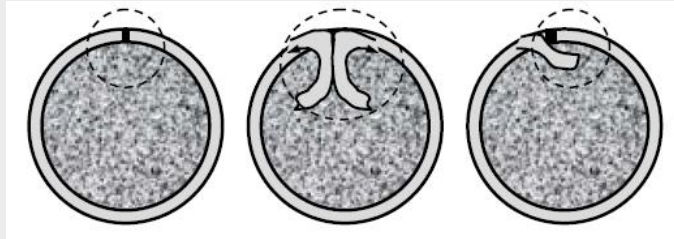
Crack resistance is approximately 7 times higher than that of seamed flux-cored wires

Products and Technologies

2 No twisting stress, long wire feed distance, high wire alignment performance

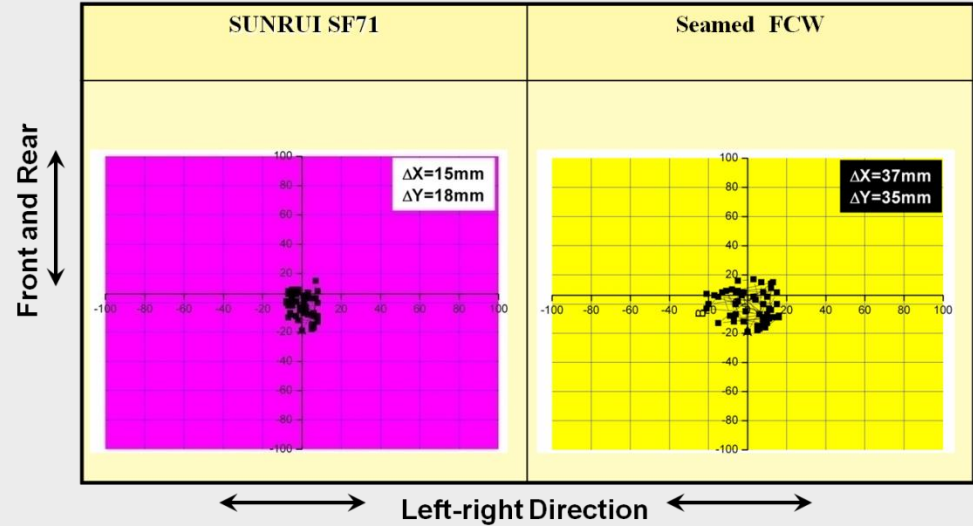


Isotropic cross-section, no twisting stress



The cross-section is anisotropic and exhibits torsional stress

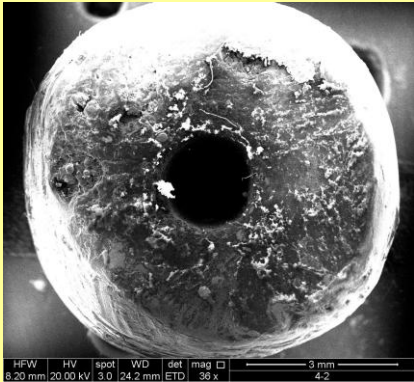
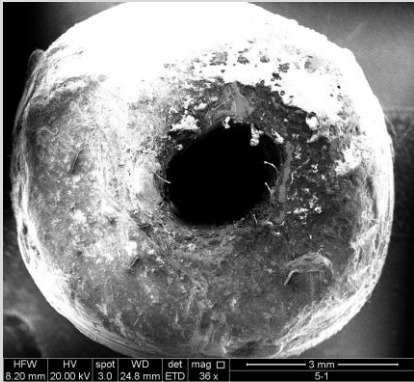
Wire's Targetability



Better suited for automated welding applications !

Products and Technologies

3 Capable of wet-copper plating process, enhancing current transfer efficiency with significantly reduced contact tip wear, thereby lowering consumable costs

Type of wire	Seamless Flux cored Wire	Seamed Flux cored Wire
Welding time 500min (10minx50) Wire Diameter: 1.2 mm Volt: 28V Current: 260 A	 <p>HFW HV spot WD det mag 3 mm 8.20 mm 20.00 kV 3.0 24.2 mm ETD 30 x 4-2</p>	 <p>HFW HV spot WD det mag 3 mm 8.20 mm 20.00 kV 3.0 24.8 mm ETD 30 x 5-1</p>
Wear Extent of Tips	0.60 mm	1.40 mm

Reduces contact tip replacement frequency, increases productive operating time, and cuts down on contact tip consumption.

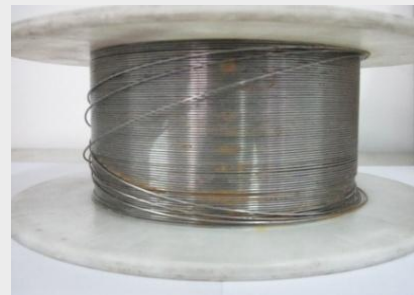
Each ton of welding wire saves approximately 33 contact tips (¥10/pc), reducing costs by around ¥330 per ton.

Products and Technologies

4 Moisture-resistant and rust-resistant, convenient for transport and storage

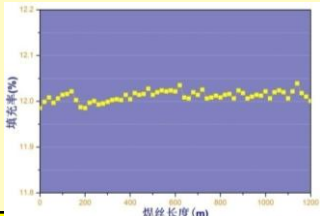
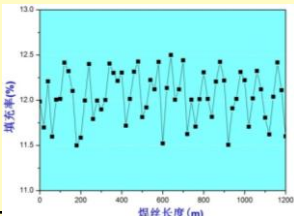


Seamless Flux Cored Wire (Copper Coated)



Seamed Flux Cored Wire (Uncoated)

5 Filling rate is stable, and there are no occurrences of powder streaking in empty pipes

Seamless Flux Cored Wire	Seamed Flux Cored Wire
	
Filling rate is stable $\pm 0.25\%$	Filling rate is unstable $\pm 0.5\%$
No powder streaking in empty pipes	Powder streaking in empty pipes may occur

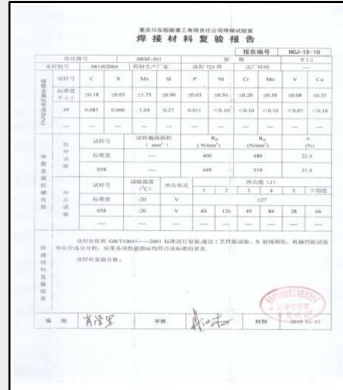
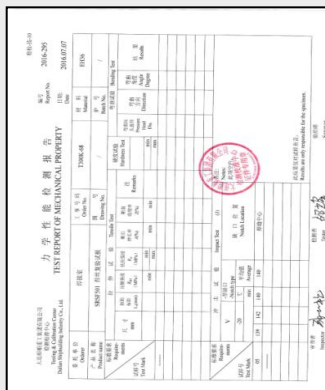
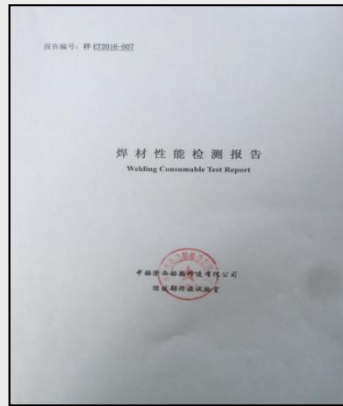
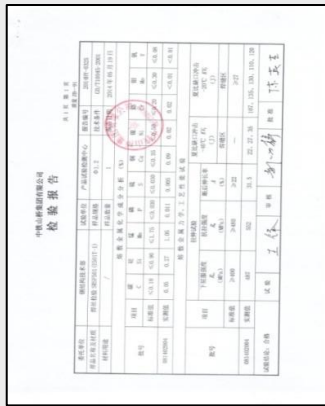
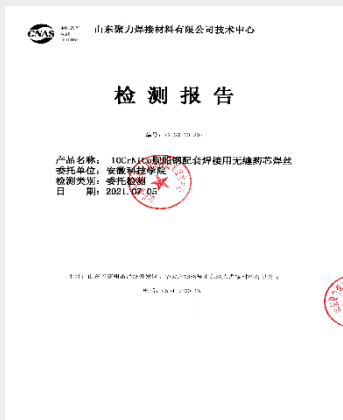
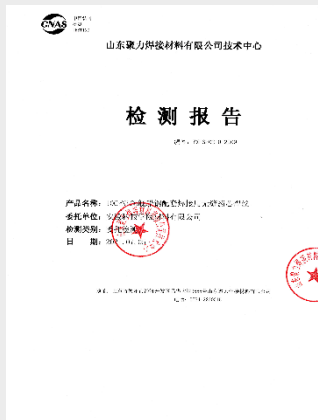


No powder streaking in empty pipes



Powder streaking in empty pipes may occur

Product Testing and Certification



Certified by multiple authoritative organizations, the performance meets international standards.

Product Testing and Certification



综合评价结论

成果名称：10CrNiCu 舰船钢配套焊接用无缝药芯焊丝研发及应用
成果完成单位：安徽科技学院、聚力新材料科技（日照）有限公司、山东聚力焊接材料有限公司、河北冀辰焊业有限公司
主要完成人员：郭纯、乔吉泰、胡瑞章、徐国松、杨涛、胡合斌、张华、林清成、张新宇、黄光站
评审专家：安徽大学孟凡明、合肥工业大学沈维晋、合肥大学徐强、合肥通用机械研究院有限公司汪兵、安徽省产品质量监督检验研究院章金奎

2025年1月23日，卧涛科技有限公司在合肥主持召开了由安徽科技学院牵头研发的《10CrNiCu 舰船钢配套焊接用无缝药芯焊丝研发及应用》科技成果评价会。与会专家听取了汇报，审阅了相关资料，经质询和讨论，形成评价意见如下：

1. 所提供的评价资料齐全、规范，符合评价要求。
2. 项目针对我国舰船、海洋平台等重要钢结构装备建造对高端焊接材料的需求，主要开展了10CrNiCu 钢（907A 钢）配套焊接用无缝药芯焊丝的研发及应用研究。通过研究无缝药芯焊丝高温退火工艺过程中药芯粉的物理、化学反应，阐明了高温退火工艺对焊缝金属析出物形貌及其对力学性能的影响。通过精准控制药芯粉中合金元素、脱氧元素的种类和比例，解决了高温退火引起的合金元素、脱氧元素化学变质的问题，成功研制出了超低扩散氢(H4)、综合性能优良的10CrNiCu（907A）舰船钢配套焊接用无缝药芯焊丝。
3. 项目成果获授权发明专利21项；发表论文10篇；制定企业标准2项；省部级成果登记2项。应用结果表明：该焊丝焊接工艺性能良好，力学性能优良，可推广应用到舰船、海洋工程、桥梁、钢结构、机械工程、管道工程等领域。产品市场前景广阔，具有较好的经济和社会效益。

专家委员会认为该项成果总体技术国际先进，同意通过科技成果评价。

评价委员会主任签字：[Signature] 副主任签字：沈维晋
评价机构：卧涛科技有限公司
2025年1月23日



参观现场焊接演示

Evaluation by a third-party technology organization: Reached an internationally advanced level.

Relevant achievements



The project has been granted 21 invention patents, published 10 papers, and established 2 enterprise standards.


Application of Achievements

 沪东中华造船(集团)有限公司
Hudong-Zhonghua Shipbuilding (Group) Co., Ltd.



 中国船舶重工股份有限公司
武昌船舶重工集团有限公司
WUZHANG SHIPBUILDING INDUSTRY GROUP CO., LTD.



 上海松昆钢结构有限公司
Shanghai Matkou Steel Structure Co., Ltd.

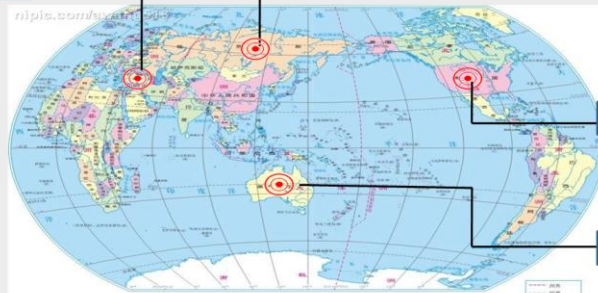
English 日本語 中文



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Turkey

Russia



USA

Australia

Products are sold to many countries in Europe and America



The product has been promoted and applied in China and several countries in Europe and the United States, mainly utilized for welding important structures such as ships, bridges, marine engineering, containers, pipelines, steel structures, and construction machinery. The additional sales amount to approximately **1.79 billion yuan.**