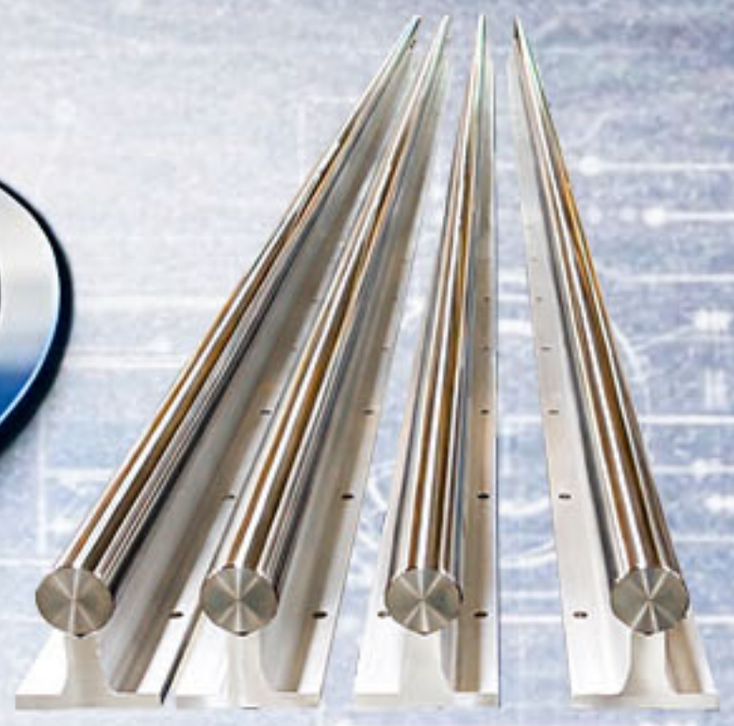

QUINNTECH SOLUTIONS

MATERIAL SELECTION FOR PRECISION LINEAR SHAFTING

A Technical Comparison of Carbon Steel, Stainless Steel, and Nitronic Alloys

Material Selection for Precision Linear Shafting

A Comparison of 1060 Case Hardened Steel, 440C Stainless Steel, 300 Series Stainless Steel, and Nitronic 50

Prepared for Quinntech Solutions / Skamar Machine

Precision linear shafting is a foundational component in automation, packaging machinery, robotics, marine systems, and heavy industrial equipment. Shaft material selection directly affects wear life, corrosion resistance, load capacity, and compatibility with linear bearings. This white paper compares four common materials used in precision linear shafting: 1060 Case Hardened Carbon Steel, 440C Stainless Steel, 300 Series Stainless Steel, and Nitronic 50.

Material Overview

Each shaft material offers a different balance of hardness, corrosion resistance, mechanical strength, and cost. Engineers must evaluate operating environment, bearing type, load requirements, and maintenance expectations when selecting the appropriate shafting material.

Comparative Performance

Property	1060 Case Hardened	440C Stainless	300 Series Stainless	Nitronic 50
Hardness	Very High	High	Low	Moderate
Wear Resistance	Excellent	Excellent	Poor	Moderate
Corrosion Resistance	Poor	Moderate	Excellent	Excellent
Strength	Moderate	High	Moderate	Very High
Typical Cost	Low	Medium	Medium	High

Engineering Selection Guide

Application Condition	Recommended Shaft Material
General industrial automation	1060 Case Hardened Steel
High wear with ball bearings	1060 Case Hardened Steel
Moderate corrosion environments	440C Stainless Steel
Washdown / food processing	440C Stainless Steel
Chemical or marine environments	300 Series Stainless
High corrosion + high strength	Nitronic 50
Naval / offshore equipment	Nitronic 50

Selecting the correct shafting material is critical to linear motion system reliability. 1060 case hardened steel dominates general industrial applications due to hardness and cost efficiency. 440C stainless steel offers a balance of corrosion resistance and hardness. 300 series stainless steel provides superior corrosion resistance for aggressive environments but sacrifices wear resistance. Nitronic 50 delivers exceptional strength and corrosion resistance for demanding marine and chemical applications.