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AMSAM-EN-EV Research and Development

Field Demonstration of Alternative Coatings for High Strength Steel (HSS)

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Overview

- Background
- Purpose
- Objective
- Test Protocol
- Firing Demo
- Results
- Summary

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Background

- Cadmium
 - Toxicity
 - Exposure
- Environmental Impact
- Weapon Systems



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Weapon Systems



Multi-Launch Rocket System (MLRS)

Army Tactical Missile System (ATACMS)



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Purpose

- The purpose of this field demonstration is to determine corrosion protection imparted by various alternative coatings for high strength steel (HSS) fasteners
- Natural and severe environments experienced on rocket motor launchers

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Objective

- Identify a coating or coatings that perform as well or better than cadmium for applicability on high strength fasteners utilized by Army rocket motor launchers



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Test Protocol

- Coatings
- Coupons
- Configuration
- Primer
- Topcoat
- Test Fixture



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Alternative Coatings

- Cadmium
 - electrodeposited
- Zinc
 - electrodeposited
- Elisha
 - mineralization
- Dacromet
 - coating
- Geomet
 - coating
- Zinc-Nickel
 - electrodeposited

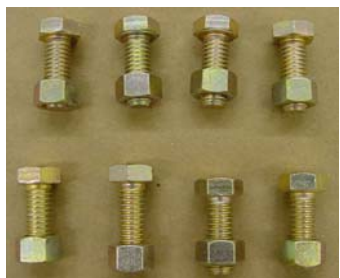
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Coated Fasteners



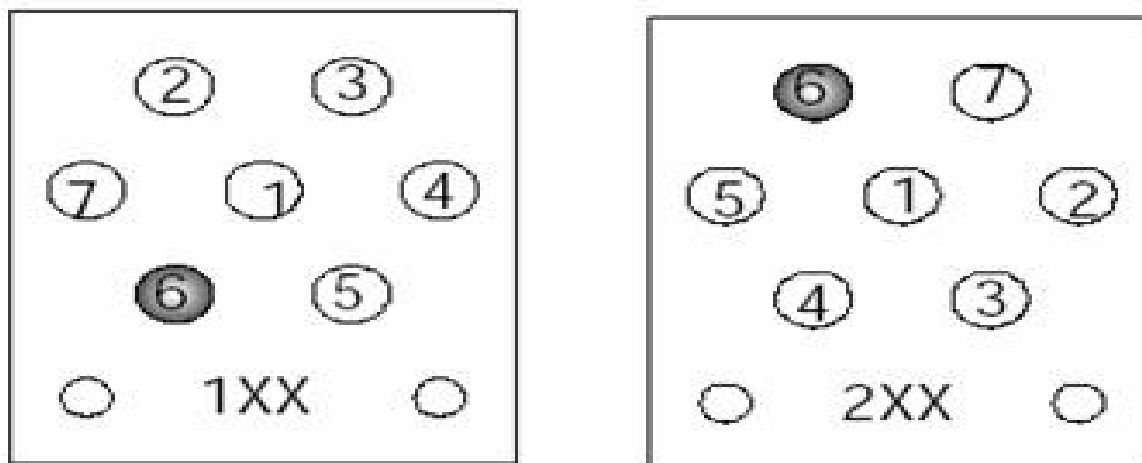
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Configuration



Torque values were based upon:

- 90% yield strength
- Manufacturer's recommended value

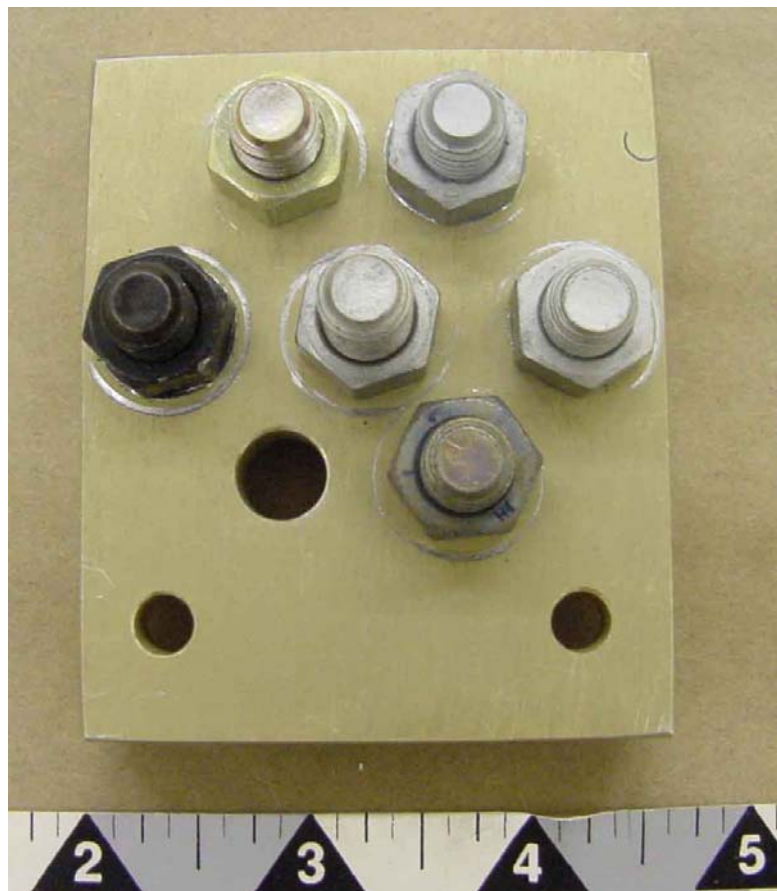
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Installed Fasteners



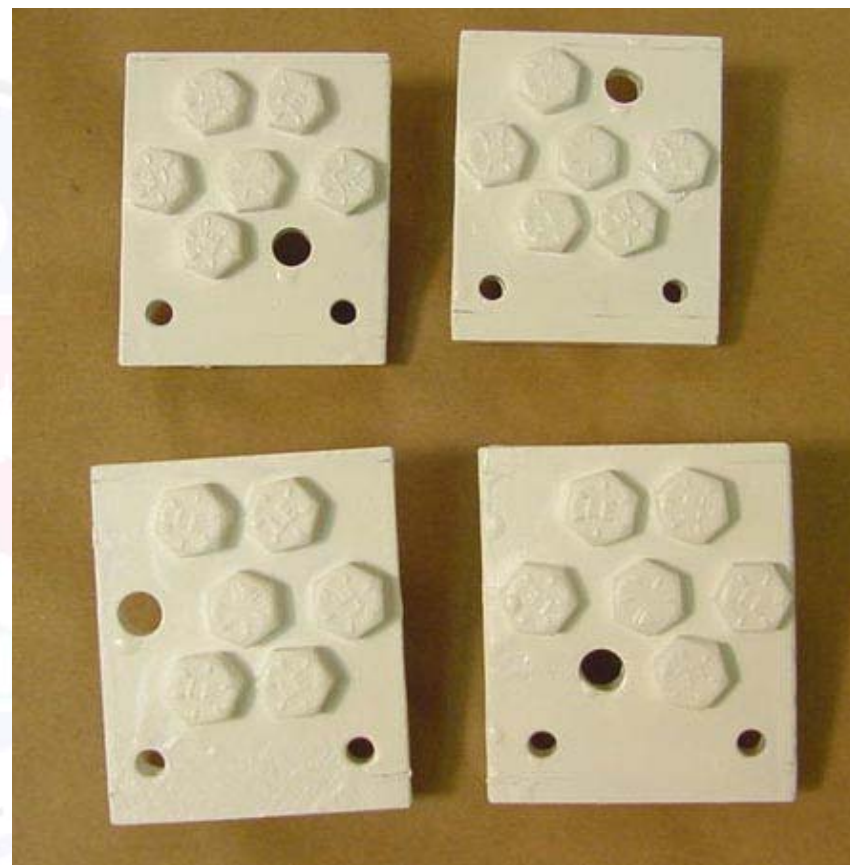
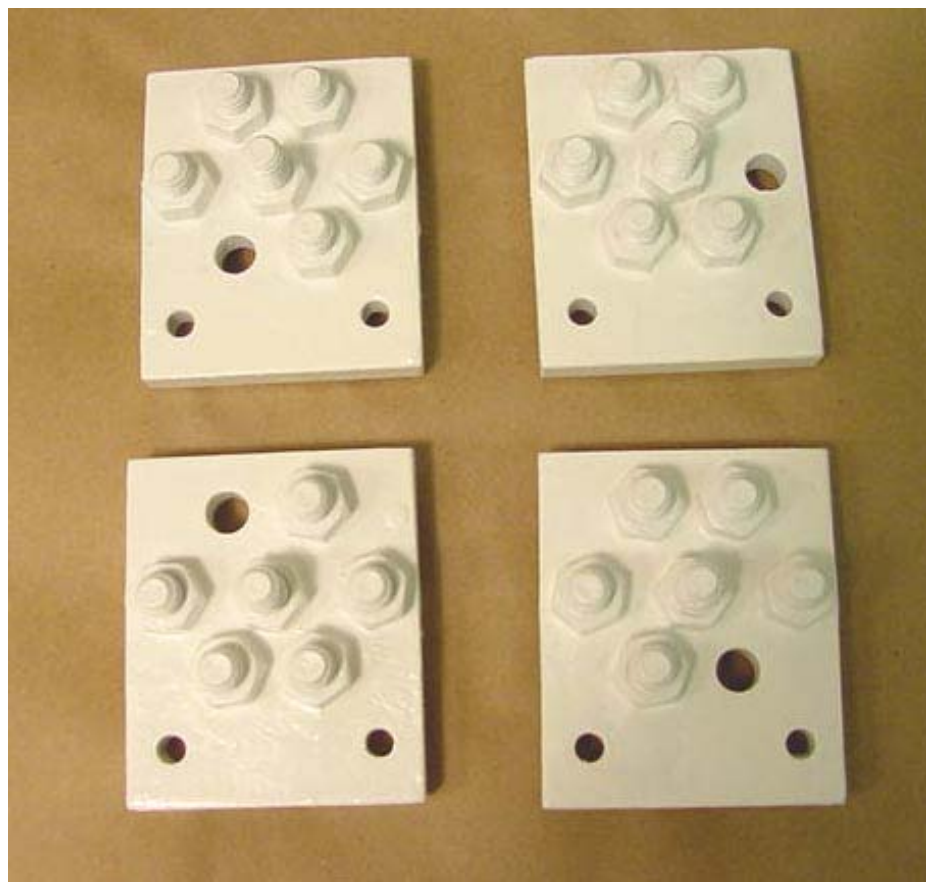
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Primed Coupons and Fasteners



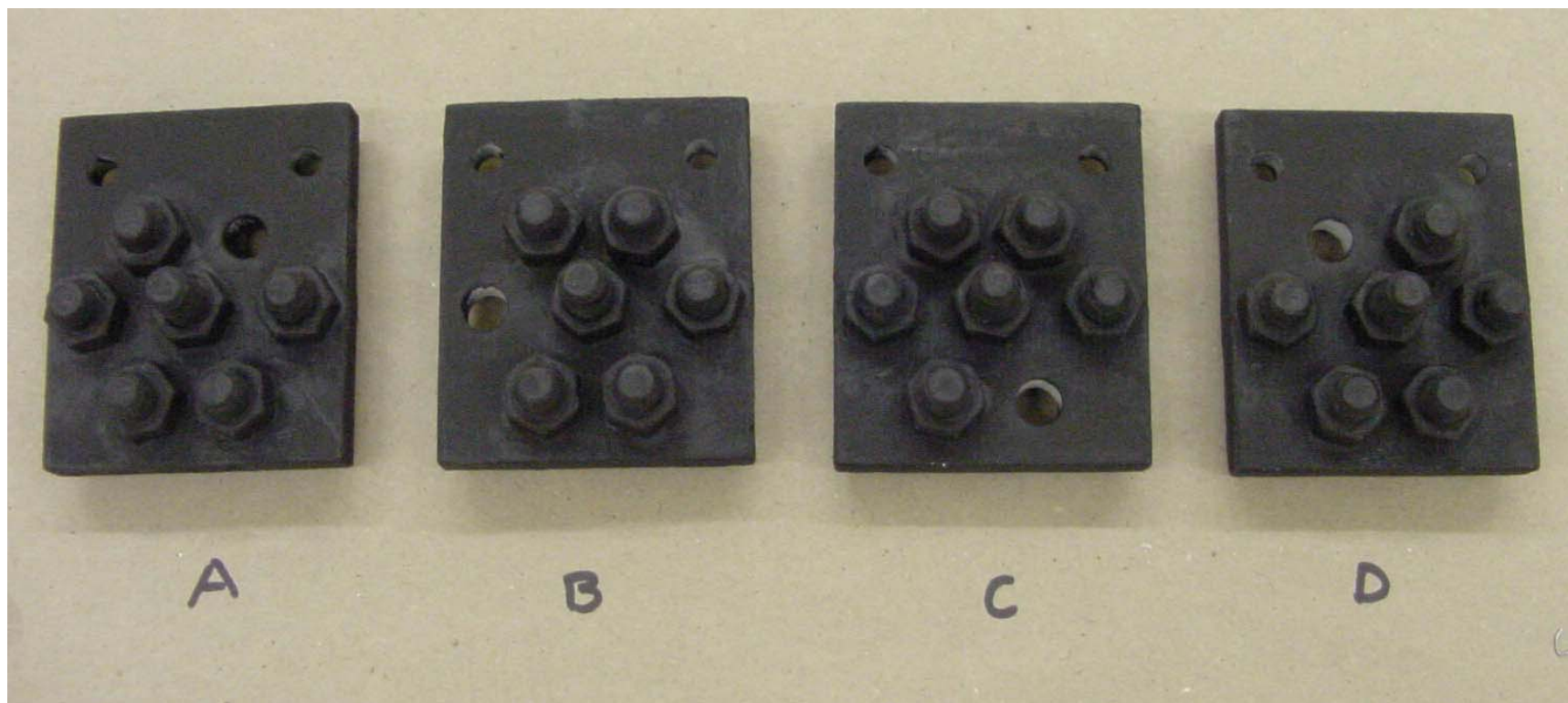
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Coupons and Fasteners w/ Topcoat



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Test Fixture



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Static Firing



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Results

- Visual Inspection
 - 6 month exposure
 - 12 month exposure
- Torque and Breakaway torque
- Tensile testing

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6 Months



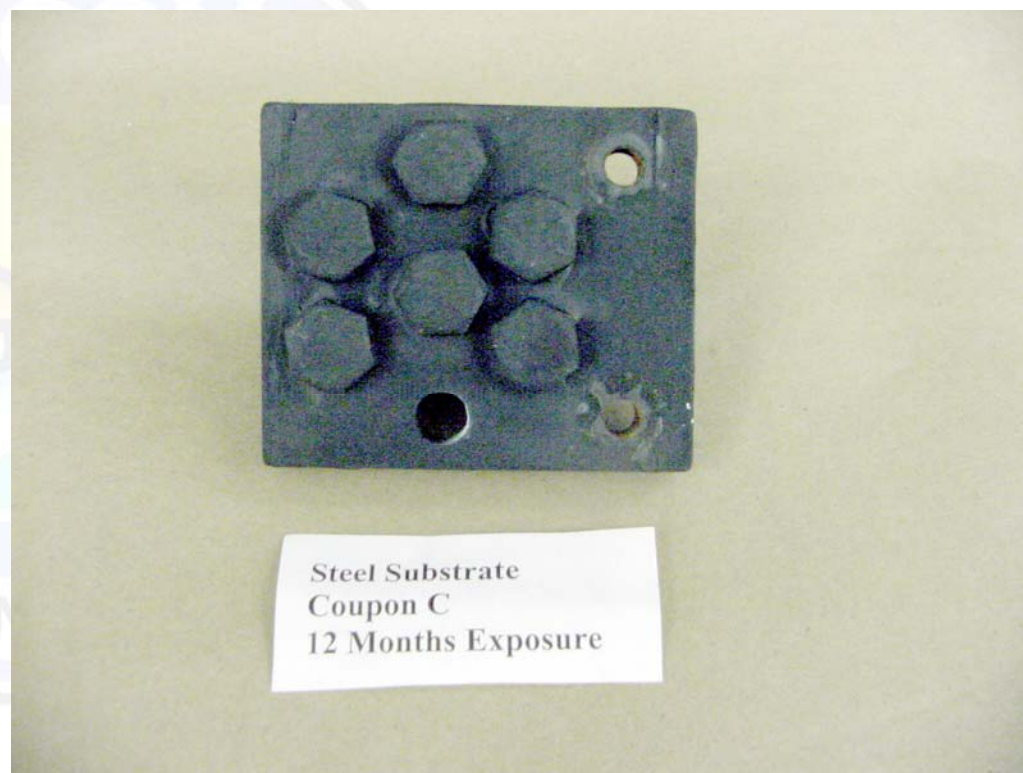
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12 Months



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Uninstalled Fasteners



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Torque Value

Coating	μ	Torque Value
Cadmium	0.08	50 ft lbs
Zinc	0.11	46 ft lbs
Elisha	0.13	53 ft lbs
Dacromet	0.11	46 ft lbs
Geomet	0.11	46 ft lbs
Zinc-Nickel	0.08	70 ft lbs

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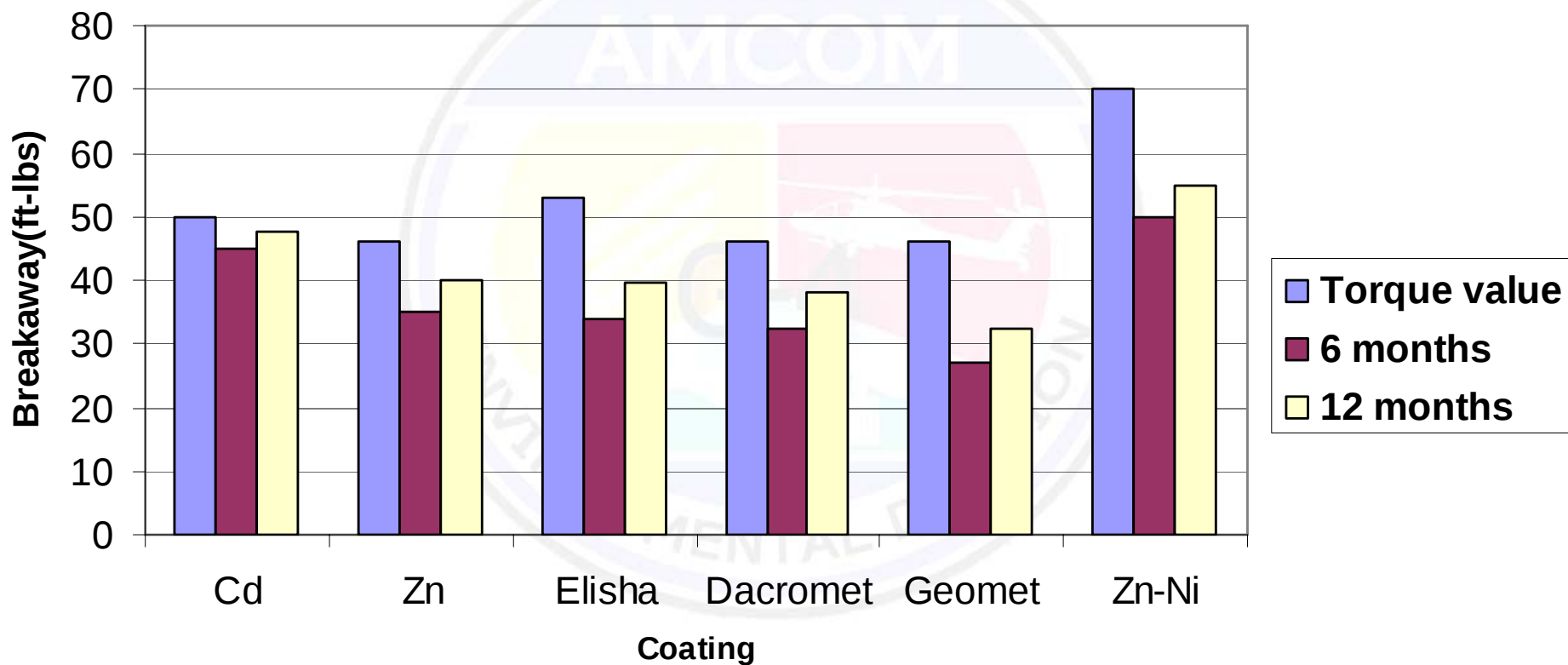


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Breakaway Torque

Aluminum Coupon



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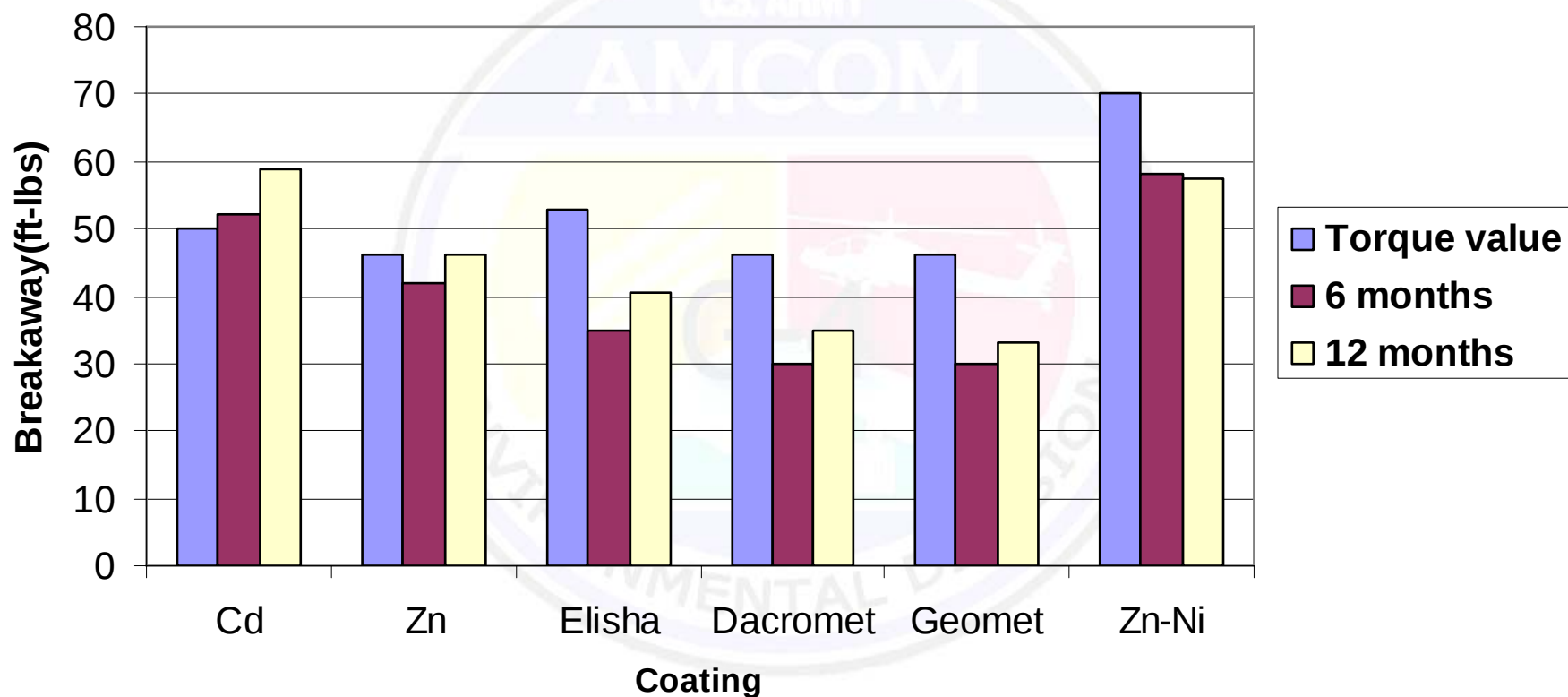


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Breakaway Torque

Steel Coupon



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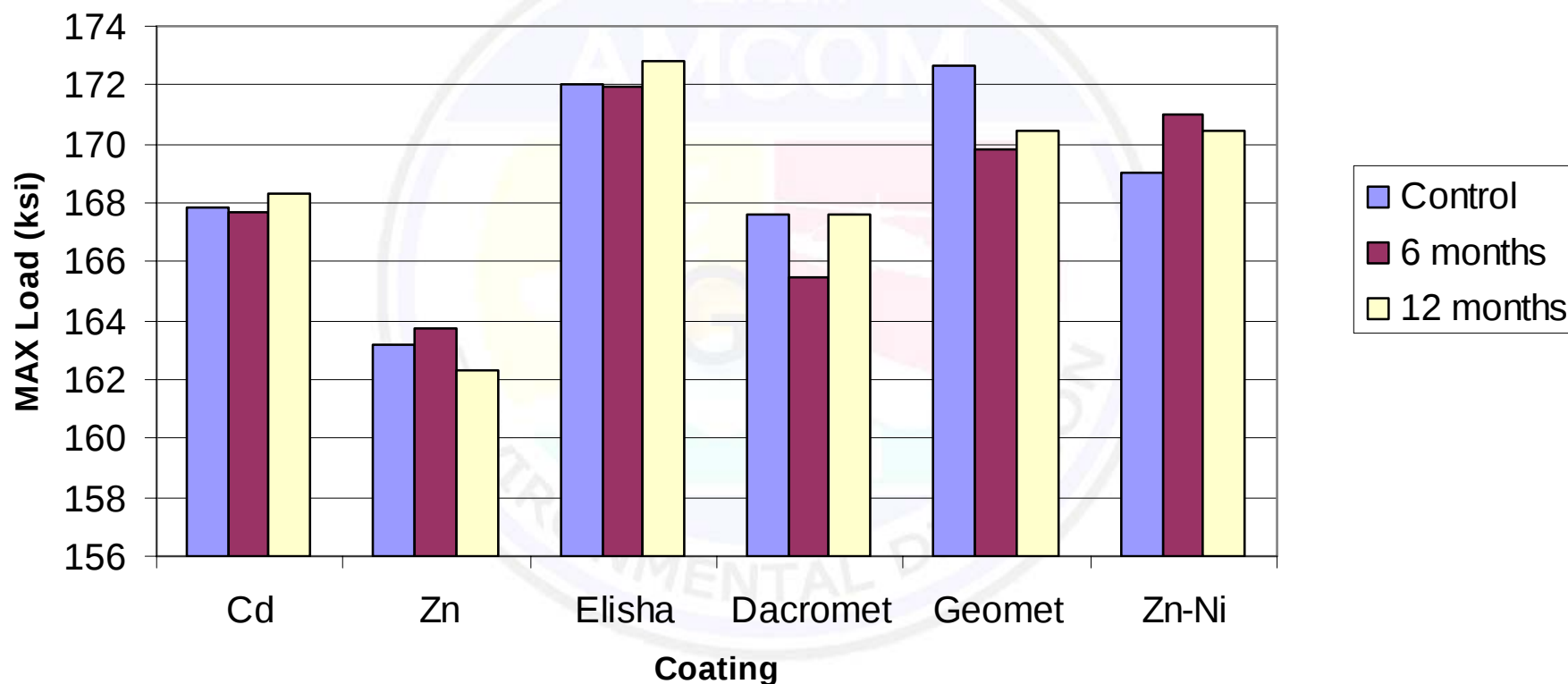


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Tensile Strength

Aluminum Coupon



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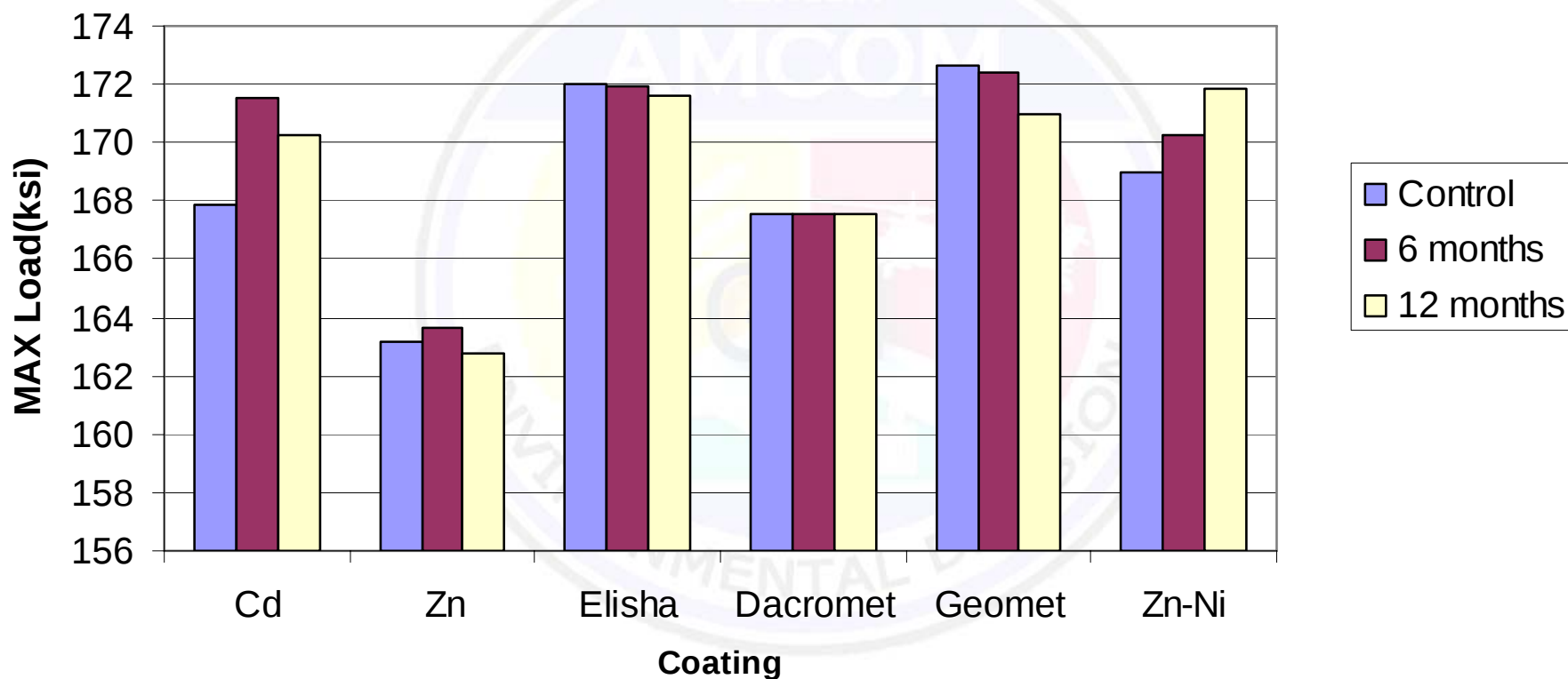


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Tensile Strength

Steel Coupon



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Summary

- Scheduling
- Points of Contact



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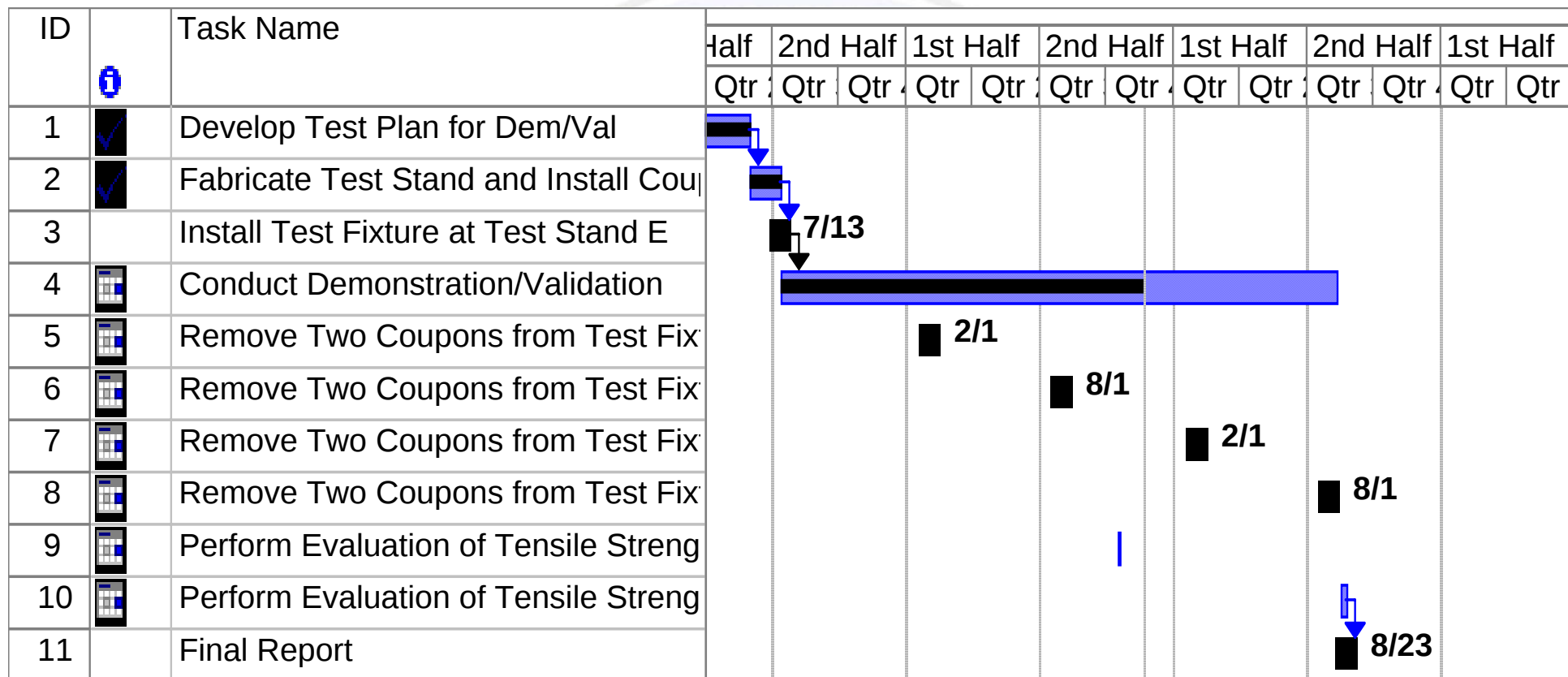


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Schedule

Field Demonstration of Cadmium Alternatives on HSS Fasteners



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