

A FAMILY OF QUALITY



TRI-STAR INDUSTRIES PTE LTD
www.tristar.com.sg

Fasteners for Critical Industries

Comprehensive Solutions for Oil & Gas, Offshore, and More

At Tri-Star Industries, we manufacture high-performance fasteners for industries such as Oil & Gas, Offshore, Refining & Petrochemicals, Subsea equipment, and Infrastructure. Our fasteners are engineered to meet the most stringent requirements, ensuring the safety, integrity, and longevity for critical assets.

Extensive Inventory of Materials

We provide an extensive inventory of alloy steel, non-ferrous and corrosion-resistant alloy materials, such as:

Material	Bolt Grade	Nut Grade	Diameter
Alloy Steel	ASTM A193 : B7, B7M	ASTM A194 2H, 2HM	1/2" - 4"
	ASTM A193 : B16	ASTM A194 7L	1/2" - 4"
	ASTM A320 : L7, L7M, L43	ASTM A194 7L, 7ML	1/2" - 4"
Stainless Steel	ASTM A193 : B8, B8M, B8T, B8MLN, B8CLNCuB, B8MLCuN, B8ML4CuN (Class 1, 1A, 1B, 1C, 1D, 2, 2B, 2C)	ASTM A194 8, 8A, 8M, 8MA, 8T, 8MLN, 8CLNCuB, 8MLCuN, 8ML4CuN	1/2" - 4"
	ASTM A320 : B8, B8M, B8T, B8MLN (Class 1, 1A, 2)	ASTM A194 8, 8A, 8M, 8MA, 8T, 8MLN	1/2" - 4"
High Temperature Stainless Steel	ASTM A453 : 660 (Class A, B, C, D)		1/2" - 4"
Super Duplex	ASTM A1082 : UNS 32750, 32760S		1/2" - 4"
Non-Ferrous	ASTM F468 : UNS C63000 - Nickel Aluminium Bronze Alloy		1/2" - 4"
	ASTM F468: Monel K500 - Nickel Copper Alloy		1/2" - 1 1/2"
High Temperature Steel	EN10269 : 20CrMoVTiB4-10 / 1.7729		1/2" - 4"
CRA	Inconel : 625, 718, 925 - Nickel Chromium Superalloy (NORSOK M-650)		1/2" - 4"
Carbon / Alloy Steel	BS EN ISO 898: Grade 8.8, 10.9, 12.9	BS EN ISO 898: Class 8, 10, 12	M8 - M39

Quality Assurance Throughout Production

We implement strict quality controls throughout our production process, including audits of steel mills and rigorous pre-shipment and incoming inspection to ensure compliance with international standards.



Trusted Industry Partner

As the Enterprise Framework Agreement (EFA) holder for stud bolts and fasteners for Shell Global, we are proud to be a trusted partner for leading industry players.

We have also supply agreements with Petronas, Pertamina, Chevron, Woodside, ADNOC, as well as EPCs and construction yards.





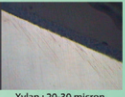






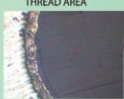



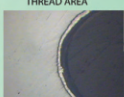
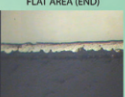





Certified Quality

We hold API 20E and 20F certifications for bolts and nuts across BSL-1, BSL-2, and BSL-3 specifications, ensuring compliance with the most rigorous quality and safety standards.



Corrosion Resistant and Anti-Seize Coatings

We apply all coatings in-house to ensure optimal quality and control. Our coatings set the standard for performance in every category.

 <p>Xylan Coating</p>	<p>Phosphate / Xylan 1424 Blue</p> <p>PROCESS FLOW</p> <ul style="list-style-type: none"> 1. Degreasing & Pickling 2. Phosphate 3. 1st Coat 4. 2nd Coat 5. Curing 	<p>THREAD AREA FLAT AREA (END)</p>   <p>Xylan : 20-30 micron</p>	 <p>SALT SPRAY TEST SPECIMENS SALT SPRAY TEST AT 7000 HOURS PH 1</p>
 <p>Zinc Plating Base with Xylan Top Coat</p>	<p>Zinc Plating / Xylan 1424 Blue</p> <p>PROCESS FLOW</p> <ul style="list-style-type: none"> 1. Degreasing & Pickling 2. Zinc Plating 3. Phosphate 4. 1st Coat 5. 2nd Coat 6. Curing 	<p>THREAD AREA FLAT AREA (END)</p>   <p>Zinc Plating : ~12 micron Xylan : 20-30 micron</p>	 <p>SALT SPRAY TEST SPECIMENS SALT SPRAY TEST AT 2500 HOURS</p>
 <p>Xylar 2 Base with Xylan Top Coat</p>	<p>Xylar 2 / Xylan 1424 Blue</p> <p>PROCESS FLOW</p> <ul style="list-style-type: none"> 1. Degreasing 2. Blasting 3. Xylar Coat 4. Curing 5. Burnishing 6. Xylan Coat 7. Curing 	<p>THREAD AREA FLAT AREA (END)</p>   <p>Xylar 2 : 20-30 micron Xylan : 20-30 micron</p>	 <p>SALT SPRAY TEST SPECIMENS SALT SPRAY TEST AT 1000 HOURS</p>
 <p>Zinc Nickel Base with Xylan Top Coat</p>	<p>Zinc Nickel Plating / Xylan 1424 Blue</p> <p>PROCESS FLOW</p> <ul style="list-style-type: none"> 1. Degreasing & Pickling 2. Zinc Nickel Plating 3. Phosphate 4. 1st Coat 5. 2nd Coat 6. Curing 	<p>THREAD AREA FLAT AREA (END)</p>   <p>Zinc Nickel : ~12 micron Xylan : 20-30 micron</p>	 <p>SALT SPRAY TEST SPECIMENS SALT SPRAY TEST AT 1000 HOURS</p>
 <p>Cadmium Plating Base with Xylan Top Coat</p>	<p>Cadmium Plating / Xylan 1424 Blue</p> <p>PROCESS FLOW</p> <ul style="list-style-type: none"> 1. Degreasing & Pickling 2. Cadmium Plating 3. Phosphate 4. 1st Coat 5. 2nd Coat 6. Curing 	<p>THREAD AREA FLAT AREA (END)</p>   <p>Cadmium : ~12 micron Xylan : 20-30 micron</p>	 <p>SALT SPRAY TEST SPECIMENS SALT SPRAY TEST AT 1000 HOURS</p>

NanoGalv® Coating Technology

NanoGalv® is the latest cutting edge coating technology from Modumetal Inc. and we are proud to be first licensee outside the USA to apply it.

NanoGalv® uses nano-laminating technology to apply Zinc-Nickel onto metal surfaces, providing groundbreaking protection. Its outstanding performance in salt spray tests demonstrates its exceptional durability.



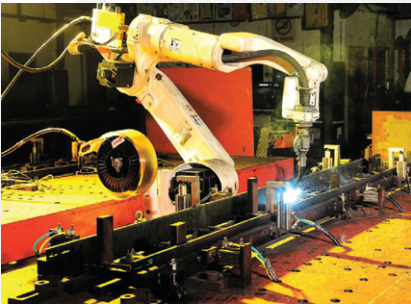
Environmentally Friendly Coating Solution

Beyond its superior corrosion resistance, NanoGalv® is also environmentally friendly, featuring a low environmental impact during both its application process and throughout its lifecycle.

M*RAK® Cable Support Systems: Reliable, High-Performance Solutions

We design and manufacture a wide range of cable support systems for **Offshore Platforms, FPSOs, HVDCs, Power Plants, Data Centres, Airports, Petrochemical plants and Refineries, and High-End Industrial and Commercial Installations.**

Our system supports the safe and efficient routing of electrical and communication cables in both harsh and controlled environments as we control every step of our design and production process, from stringent audits of our raw material suppliers to rigorous inspections before shipment, ensuring that all components meet industry-specific requirements.



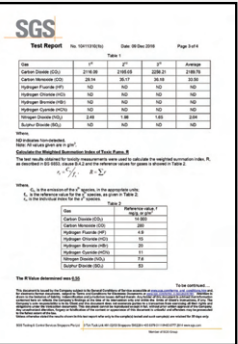
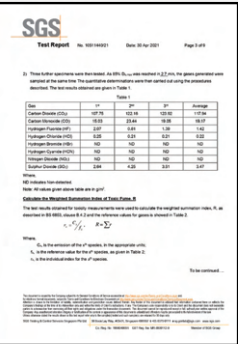
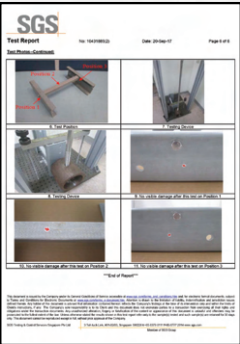
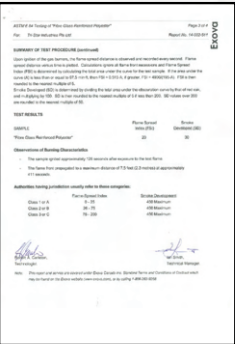
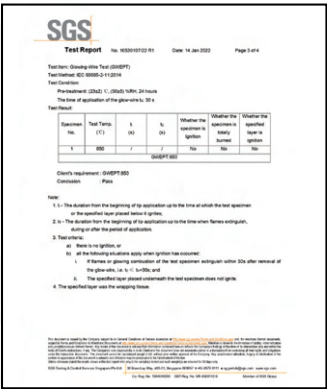
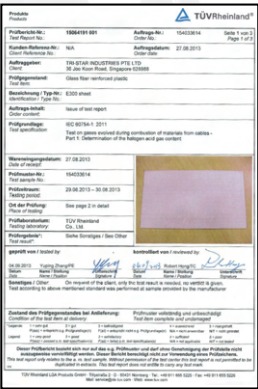
Materials and Certifications

MRAK cable support systems are available in a variety of materials, tailored to meet the unique needs of each application. These materials include:

Material	Variation	Coating
Stainless Steel	304,316,316L	None; VCI Coating
Mild & High Silicon Steel	ASTM A36, S235, S275, S355	Hot-Dipped Galvanised; Epoxy Powder Coating
Electro-Galvanized Steel	JIS G 3313, JIS G3302	Epoxy Powder Coating
Pre-Hot-Dip Galvanized Steel	AS 1397	Epoxy Powder Coating
Fibre Reinforced Plastic	Polyester, Vinyl Ester	None
Aluminium	6061,6063	None

Our cable ladders are certified to **NEMA 5E standards**, while cable trunkings meet **SS249:1981 standards**.

Span/Load Designation on M*RAK Cable Ladder and Tray													
Side Rail Height	NEMA	8A	8B	8C	12A	12B	12C	16A	16B	16C	20A	20B	20C
38 mm		FB38	FB38	FB38									
		FB50	FB50	FB50									
50 mm		HRF50	HRF50	HRF50									
		CPL75	CPL75										
75 mm		CI75	CI75										
		HL75	HL75	HL75									
		FB75	FB75	FB75									
		HRF100	HRF100	HRF100									
		CPL100	CPL100	CPL100	CPL100								
100 mm		CI100	CI100	CI100	CI100								
		HL100	HL100	HL100	HL100	HL100	HL100						
		CPL125	CPL125	CPL125	CPL125	CPL125	CPL125						
125 mm		CI125	CI125	CI125	CI125	CI125	CI125						
		HL125	HL125	HL125	HL125	HL125	HL125	HL125	HL125	HL125	HL125	HL125	
		CPL150	CPL150	CPL150	CPL150	CPL150	CPL150	CPL150	CPL150	CPL150	CPL150		
150 mm		CI150	CI150	CI150	CI150	CI150	CI150	CI150	CI150	CI150	CI150	CI150	
		HL150	HL150	HL150	HL150	HL150	HL150	HL150	HL150	HL150	HL150	HL150	
		AI150	AI150	AI150	AI150	AI150	AI150	AI150	AI150	AI150	AI150	AI150	HL150
													AI150



FRP Cable Support Systems: Built for Extreme Performance

Load Designation of G-series Ladder (NEMA FG-1: 1993)

Side Rail Height (mm)	Duty Type	8A	8B	8C	12A	12B	12C	16A	16B	16C	20A	20B	20C
150	Heavy										105 kg/m	131 kg/m	156 kg/m
100	Medium							94 kg/m	129 kg/m	162 kg/m			

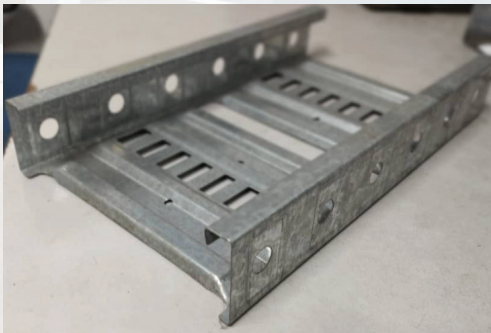
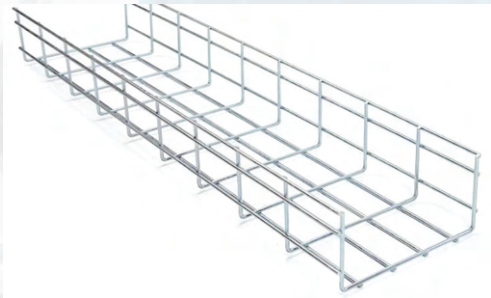
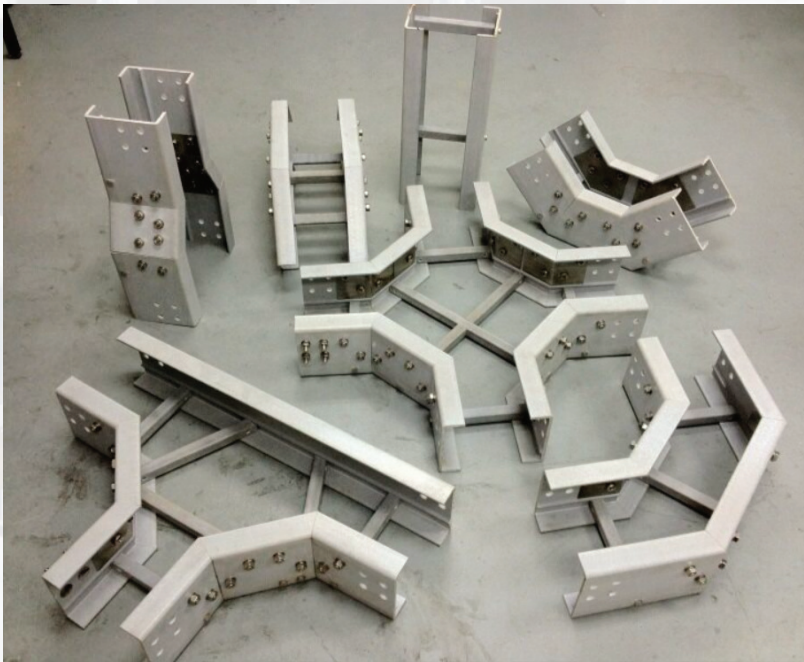
- **High load-carrying capacities** certified to **NEMA FG-1** standards
- Available in **Polyester, Vinyl Ester**
- **Anti-Static Additive** available upon request for specialized applications

Tests and Standards

Our FRP systems are rigorously tested and meet the following international standards:

- **Fire Rating** to **BS 476 Part 7** or **ASTM E84 Class 1**
- **Halogen-Free** certified to **IEC 60754-1**
- **Flame Propagation** compliance with **BS 476 Part 6**
- **UV Protection** according to **BS 2782**
- **Smoke Emission** certified to **BS 6853**
- **High Temperature Flame Test** compliant with **IEC 332 Part 3**

These features make FRP systems ideal for environments requiring non-corrosive, fire-resistant, and UV-protected solutions.



Comprehensive Services from Design to Maintenance

DIMET®, a brand of Tri-Star Industries, has provided cathodic protection solutions since 1970, earning global recognition in corrosion prevention. Tri-Star offers **comprehensive services**, covering design, manufacturing, installation, commissioning, and maintenance, with expertise in sacrificial anode systems, impressed current systems, and other corrosion protection products.



Service Offerings

Field Surveys

- Measurement of soil and water resistivity, pH, redox potential, and pipe-to-soil potential
- Offshore platform potential surveys
- CIPS/DCVG Survey, CAT survey and Pearson Survey)
- Corrosion investigations, including stray current analysis
- Interference Mitigation Studies including AC Modelling & Simulation

Design & Installation

- Conceptual and detailed design (FEED) of CP systems
- Preparation of material lists, installation drawings, and procedures
- Installation supervision by NACE-certified engineers

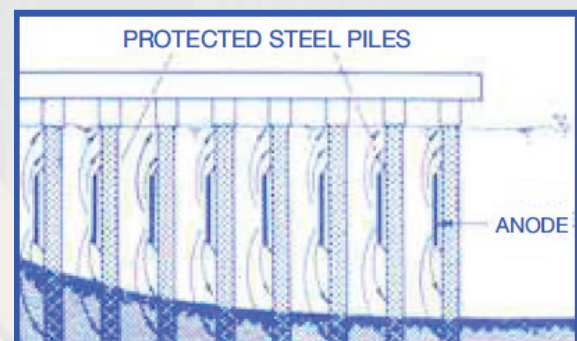
Commissioning

- Complete commissioning of CP systems with comprehensive reports and operation manuals



Maintenance & Troubleshooting

- Periodic inspections and performance monitoring
- CP system audits, troubleshooting, and interference mitigation
- On-site personnel training for system operation and maintenance

Jetty Steel Piles Protected by Sacrificial Anodes



DNV Type Approval Certificate, our solutions meet rigorous industry standards, delivering reliable corrosion protection for critical infrastructure.

		Certificate No: TA50001114 Revision No: 2
TYPE APPROVAL CERTIFICATE		
This is to certify: That the Sacrificial Anode Material for Corrosion Protection with type designation(s) DIMET Aluminium Anode (DNV-A) Issued to Tri-Star Industries Pte Ltd Singapore, Singapore Is found to comply with: DNV class programme DNV CP-0107 – Type approval – Sacrificial anode materials DNV rules for classification – Ships DNV recommended practice DNV-RP-B401 – Cathodic protection design, May 2021 NORSOK Standard M-503 Cathodic protection, Edition 3, May 2007		
Application: The mean current capacity of the sacrificial anode material after 12 months galvanostatic control testing is 2536 Ah/kg. The mean closed circuit potential is -1074 mV vs. Ag/AgCl seawater. Product(s) approved by this certificate is/are accepted for installation on all vessels classed by DNV.		
Issued at Hamburg on 2023-08-02 This Certificate is valid until 2028-08-01. DNV local unit: Singapore Approval Engineer: Gele Hersvik	 for DNV Digitally Signed By: Thorsten Lohmann Location: DNV Hamburg, Germany Signing Date: 02.08.2023 – Issued at Thorsten Lohmann Head of Section	This Certificate is subject to terms and conditions outlined. Any significant change in design or construction may render this Certificate invalid. LEGAL DISCLAIMER: Unless otherwise stated in the application contract with the holder of this document, or following from regulatory law, the liability of DNV AS, its parent companies and their subsidiaries as well as their officers, directors and employees (DNV's entire firm or its constituent parts) is limited to the extent permitted by the applicable law of the country of domicile or residence (hereinafter, "liability"). DNV Form code TA 2011 Revision: 2022-12 www.dnv.com Page 1 of 3

Applications of Cathodic Protection

Offshore Platforms & Pipelines

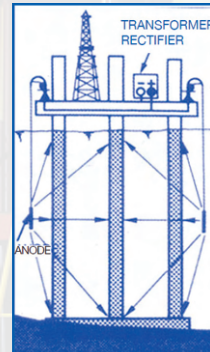
Tri-Star provides high-performance cathodic protection systems for Offshore & Onshore Structures, ensuring long-term corrosion protection in harsh corrosive environments:

Offshore includes Platforms, Jackets, Jetties, Piles, Pontoons, FPSO tanks

Onshore includes Pipelines, Storage tanks, vessels, mounded bullets

- **Sacrificial Anodes:** Using Aluminium/Zinc/Magnesium anodes
- **Impressed Current Systems:** Using MMO/HiSiFe

Jack-Up Rig with Impressed Current System



Sacrificial Anodes

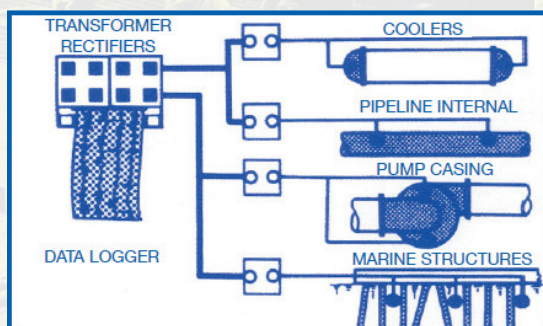


Industrial Equipment & Power Systems

In industrial facilities and power plants, DIMET®'s cathodic protection systems safeguard critical infrastructure such as cooling towers, transformers, and chemical storage tanks:

- Customized Systems: Systems are tailored to specific operational conditions like water velocity and temperature.
- Automated Monitoring: Real-time tracking of corrosion through automated control and monitoring systems.

Marine Coolers and Transformers Protected by DIMET® Systems



CP Test Station



Retrofitted Skids



Quality Assurance & Monitoring

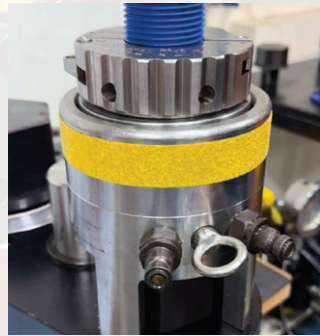
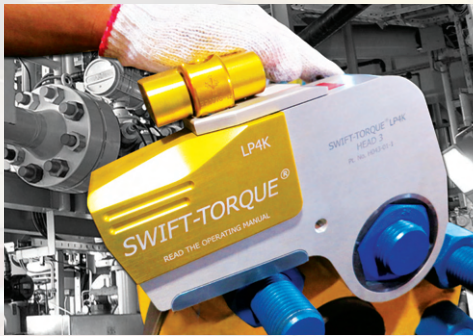
At Tri-Star Industries, we ensure top-tier standards through spectrographic analysis of materials and products. Offshore platforms are equipped with monitoring instruments to maintain long-term corrosion protection, complemented by regular inspections and audits to ensure system reliability and longevity.

With a proven track record of successful projects, DIMET® Cathodic Protection solutions represent an investment in quality, performance, and cost-efficiency. Backed by rigorous quality assurance, our solutions are applied across industries—from offshore platforms to industrial facilities—providing reliable protection that extends the lifespan of metal structures, even in the most challenging environments.

Comprehensive Equipment and Expert Services

At Tri-Star, we design and manufacture our own topside and subsea tensioners and torque tools. We also offer complementary equipment—such as nut splitters and torque multipliers—without being restricted by specific brands.

Through sales, rental, or bolt tightening services, our experienced technicians ensure every operation is carried out precisely.



Engineering Expertise and Tailored Solutions

We provide pre-engineering designs, tool fit checks, and bolt load calculations to help clients optimize performance. Our team identifies potential issues early and delivers tailored solutions, ensuring seamless communication with asset owners and operators.



Leak-Free Solutions and Certified Training

Tools and Industry Expertise Across Key Regions

Our tools are available in **Singapore, Malaysia, Indonesia, and Perth, Australia**. We bring extensive experience in supporting oil and gas operations—including onshore, offshore, and subsea—along with LNG plants, refineries, petrochemical facilities, power stations, and fabrication yards.



ECITB-Certified Training for Precision and Reliability

Proper training ensures right-first-time solutions. In partnership with **Jasable**, Tri-Star offers ECITB-certified courses that combine theory and hands-on experience, enhancing precision and operational reliability.

JASBOLT: Flange Management with Real-Time Data Accuracy

The **JASBOLT system** integrates flange management software with real-time data-capturing hardware. It records every operation—documenting what was applied, by whom, and where—for full transparency and control.



Reliable Joint Integrity Management for Leak-Free Startups

The JASBOLT system provides:

- Customized bolt-tightening procedures and engineering standards
- Detailed flange, gasket, and bolting specifications
- Certified operators using the correct equipment

With real-time monitoring, the system minimizes risks such as gasket overloading or shortcuts, ensuring **leak-free startups** and consistent performance across projects. Historical data enables continuous improvement and scalability across plant sites.

Optimized Tools for Greater Efficiency

- Swift Torque Wrench: Lightweight aluminium design, 32° rotation for faster operation, and quick cassette changes
- Topside MPR Tensioner: Compact size with high load capacity, ideal for tight spaces

Comprehensive Monitoring and Traceability

JASBOLT ensures smooth operations by combining real-time monitoring with full traceability, accelerating project completion and improving operational reliability.

Portfolios

MODEC(ExxonMobil) Uaru FPSO Project for offshore Guyana



- Fasteners - Supplied stud bolts and nuts A320 L7, L7M alloy steel (zinc nickel plating + PTFE topcoat), Inconel 718 and A1082 super duplex(32760S) complied with Norsok M-650(PTFE coating) ~ 300 tons;
- Cable Support System - Supplied SS316L cable ladders/trays ~ 30km

SAIPEM / TOTAL Energies Kaombo Sul & Norte oil production



- Cathodic Protection System – Supplied more than 350 Tonnes of Dimet Sacrificial Anodes
- Cable Support System - Supplied SS316L cable ladders/trays ~ 60 km;
- Fasteners - Supplied stud bolts and nuts A193 B7, A320 L7 HDG alloy steel, A193 B8M and A453 660 nickel alloy ~ 350 tons
- Bolting- Supplied Rental and manpower for Bolting with Hydraulic torque wrenches and Topside Tensioner.

DYNA-MAC Engineering (SBM) ONE GUYANA FPSO Project



- Bolting – Supplied Rental and services of Hydraulic torque wrenches and Topside Tensioner.
- Cable Support System - Supplied SS316L cable ladders and trays ~ 23km;

TECHNIP ENERGIES NESTE SINGAPORE EXPANSION PROJECT



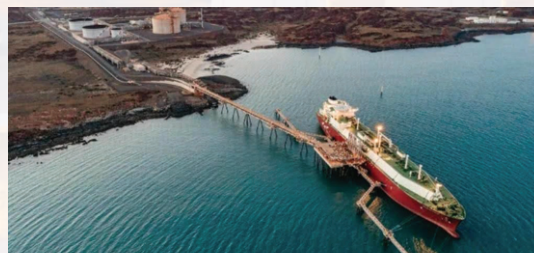
- Fasteners: Supplied A453 660 stud bolts and nuts for piping

SAIPEM Qatar Energy's North Field Production Sustainability (NFPS) Project for Qatar Gas



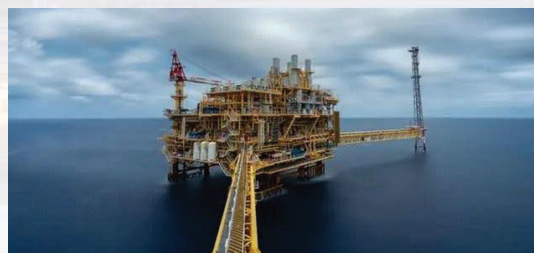
- Cathodic Protection System –Supplied more than 1000 Tonnes of Dimet Sacrificial Anodes

QINGDAO MCDERMOTT WUCHUAN / SUBSEA 7 Scarborough Project



- Fasteners – Supplied stud bolts and nuts L43 B7 6625 SDSS ~ 250 tons
- Cathodic Protection System –Supplied of Dimet Sacrificial Anodes

CHIYODA CORP North Field Expansion Project



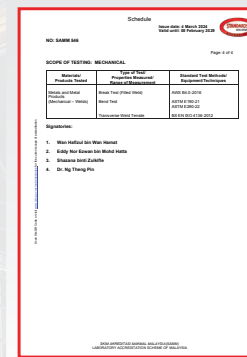
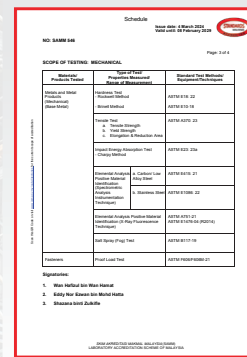
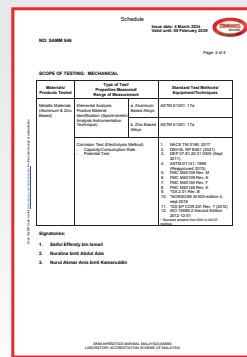
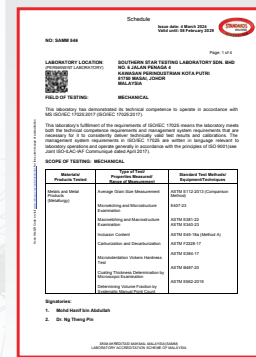
- Fasteners - Supplied stud bolts and nuts A193 B7, B7M, B16 and A320 L7, L7M, L43 ~ 4000 tons

MCDERMOTT / SEATRIUM FPU Project for Shell Crux



- Fasteners - Supplied A193 B7, A320 L7 stud bolts and nuts with zinc nickel plating + PTFE topcoat and other structure and stainless-steel fasteners ~ 70 tons;
- Cathodic Protection System –Supplied more than 550 Tonnes of Dimet Sacrificial Anodes

Certifications



Manufacturing Locations



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