



PIPE SUPPORT SOLUTIONS WORLDWIDE

CPA MISSION STATEMENT



Our Mission

To fulfil and exceed unique client requirements by designing and manufacturing the highest quality pipe suspension equipment and associated steelwork at very competitive prices.

To deliver on our promises, on time, and provide support every step along the way.

To build lasting, trustworthy relationships with our valued customers.

C&P GROUP STRUCTURE

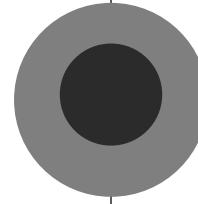


PARENT
COMPANY
CARPENTER & PATERSON LIMITED
WELSHPOOL,
UK
Est. 1956

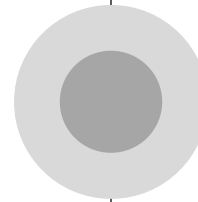


WHOLLY OWNED
SUBSIDIARY
CARPENTER & PATERSON ASIA LIMITED
BANGKOK,
THAILAND
Est. 2012

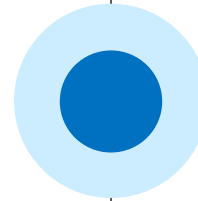
C&P HISTORY



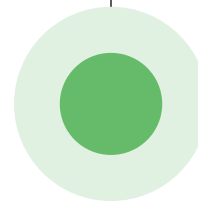
1921
Carpenter & Paterson Inc. is formed



1956
Carpenter & Paterson Limited (C&P) is formed as a wholly owned subsidiary



1989
Carpenter & Paterson Inc. sells C&P to Mr John Lee



2012
C&P forms Carpenter & Paterson Asia Ltd as a wholly owned subsidiary

C&P KEY FIGURES



\$5m

Assets



\$10M

Average Revenue



170

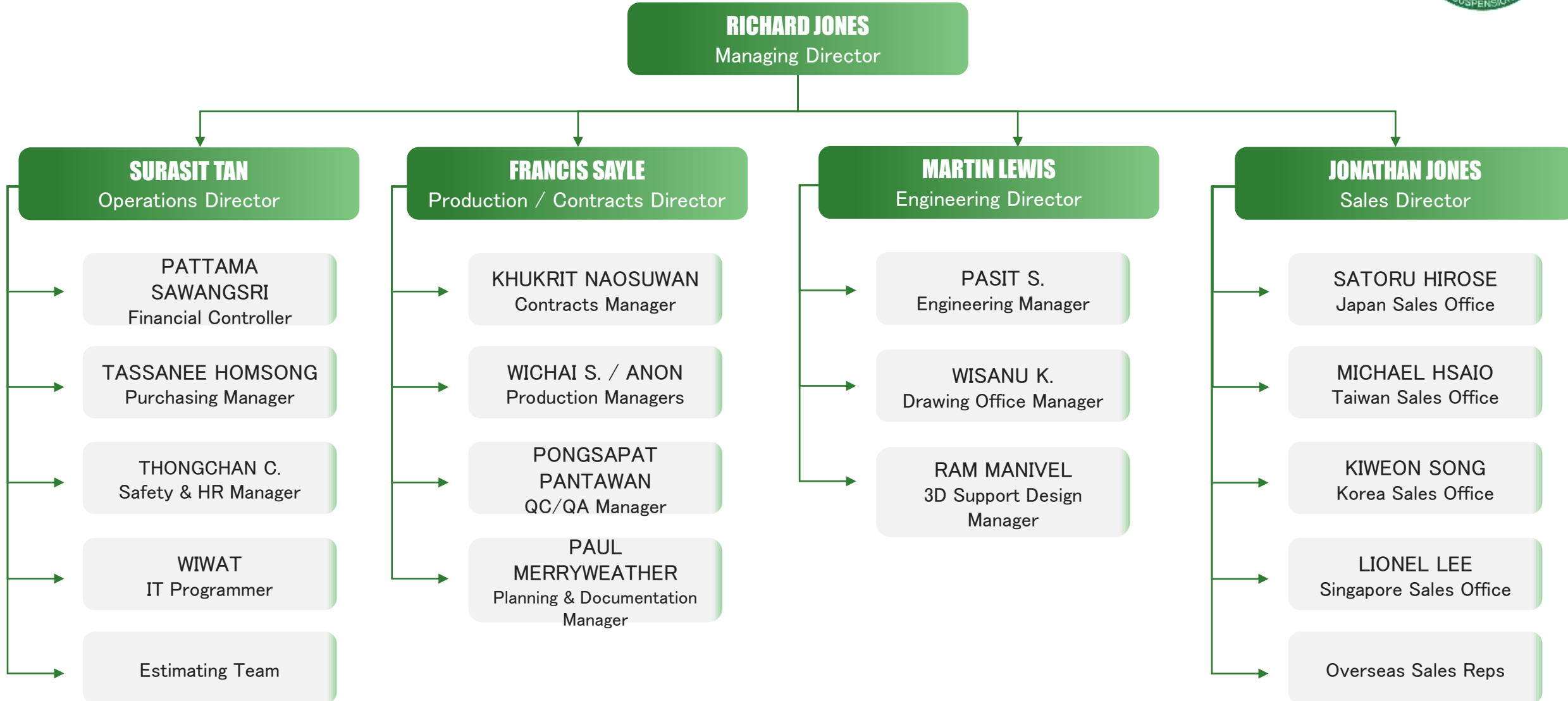
Employees



300t/month

Production capacity

CPA ORGANIZATIONAL CHART



ISO CERTIFICATIONS



QUALITY

ISO 9001

HEALTH & SAFETY

ISO 45001

ENVIRONMENT

ISO 14001

INDUSTRIES WE SERVE



OIL & GAS

- UPSTREAM
- ONSHORE / OFFSHORE
- MIDSTREAM
- DOWNSTREAM



LNG

- LNG LIQUEFACTION (EXPORT)
- LNG REGAS (IMPORT)
- LNG TERMINALS
- FPSO's
- LNG CARRIERS
- LNG STORAGE TANKS



PETROCHEMICAL

- HYDROCARBON PROCESSING
- ETHYLENE
- PROPYLENE
- AMMONIA
- ETC



POWER GENERATION

- GAS FIRED
- BIOFUEL FIRED
- RENEWABLES FIRED
- NUCLEAR FIRED
- COAL / OIL FIRED

OUR CLIENTS



RECENT MAJOR CONTRACTS EXECUTED – LNG EXPORT



1,000+

Cryogenic + Other
Supports

TORTUE
LNG FPSO



26,000+

Cryogenic
Supports

LNG
CANADA



600+

Cryogenic
Supports

GOLDEN
PASS LNG



400+

Cryogenic Supports

PLAQUEMINES
LNG



RECENT MAJOR CONTRACTS EXECUTED – LNG IMPORT



1,000+

Cryogenic Supports

CPC LNG 3RD
TERMINAL



1,000+

Cryogenic + Spring
Supports

PTT LNG
NONG FAB



600+

Cryogenic Supports

SINGAPORE
REGAS
PLANT



100+

Spring Supports

CPC YUNG-AN
LNG TERMINAL



RECENT MAJOR CONTRACTS EXECUTED – PETROCHEMICAL



4,000+

Cryogenic Supports

JAMNAGAR
(J3)



1,000+

Cryogenic + Spring
Supports

LONGSON
OLEFINS



800+

Cryogenic Supports

BAPCO
MODERNIZATION



1,000+

Spring + Other
Supports

NESTE
SINGAPORE
EXPANSION



RECENT MAJOR CONTRACTS EXECUTED – POWER GENERATION



600+

Spring + Other
Supports

TUXPAN
POWER PLANT



300+

Sliding Plates

DOS
BOCAS



300+

Spring Supports

HSINTA
THERMAL



3,000+

Spring + Other
Supports

VARIOUS IN
THAILAND





STRATEGICALLY LOCATED



NO CUSTOM DUTIES



**NO EXCISE TAX ON
IMPORTED/EXPORTED MATERIALS**



**CLOSE TO INTERNATIONAL
AIRPORT AND SEAPORTS**



CPA PREMISES



SITE AREA 10,750 sqm



WORKSHOP AREA 5,260 sqm



**300 t/month
PRODUCTION CAPACITY**



**CLOSE TO INTERNATIONAL
AIRPORT AND SEAPORTS**



FABRICATION BAY





FABRICATION



1

CUTTING





FABRICATION



1

CUTTING

2

ROLLING



FABRICATION



1

CUTTING

2

ROLLING

3

PRESSING





FABRICATION



1

CUTTING

2

ROLLING

3

PRESSING

4

WELDING





FABRICATION



1

CUTTING

2

ROLLING

3

PRESSING

4

WELDING

5

THREADING





IN-HOUSE SHOTBLASTING



IN ACCORDANCE WITH SA 3



**EFFECTIVE METHOD OF ABRASIVE
BLAST CLEANING**



REMOVES SURFACE CONTAMINANTS



**ROUGHENS / 'KEYS'
STEEL SURFACE**



**IMPROVES PICK UP
OF ZINC / PAINT**



HOT DIP GALVANISING



IN ACCORDANCE WITH ASTM A123



**DEGREASED THEN PICKLED
(IN HYDROCHLORIC ACID)**



**DIPPED IN FLUX SOLUTION
(ZINC AMMONIUM CHLORIDE)**



DIPPED IN MOLTEN ZINC BATH



**WITHDRAWN FROM BATH
AND DRAINED**



IN-HOUSE PAINTING



STEEL IS SHOTBLASTED BEFORE PAINT TO ENSURE MAXIMUM PICK UP OF PAINT



PAINT TYPE AND DRY FILM THICKNESS APPLIED ACCORDING TO CLIENT SPECIFICATIONS



PAINT APPLIED VIA AIRLESS SPRAY GUN



CHECKS PERFORMED BEFORE PAINTING – ENSURE SURFACE & AIR TEMP BETWEEN 10c-40c & RELATIVE HUMIDITY LESS THAN 85%



TESTS (e.g. DFT, ADHESION, PULL OFF ETC) PERFORMED AS REQUIRED BY QUALIFIED PERSONNEL



ASSEMBLY, INSPECTION & PACKING BAY





CPA PRODUCT RANGE



VARIABLE EFFORT SPRING SUPPORTS



**ACCOMMODATES VERTICAL
DISPLACEMENT OF PIPING SYSTEM**



**VES RECOMMENDED FOR
DISPLACEMENTS UP TO 75MM**



**STANDARD LOAD CARRYING
CAPACITY UP TO 23,700 KGS**



**VES PRODUCED IN 4 BASIC TRAVEL
RANGES – 35/70/140/210MM**



'AV' TYPE & 'LV' TYPE AVAILABLE



VARIABLE SUPPORTS LAID OUT FOR INSPECTION

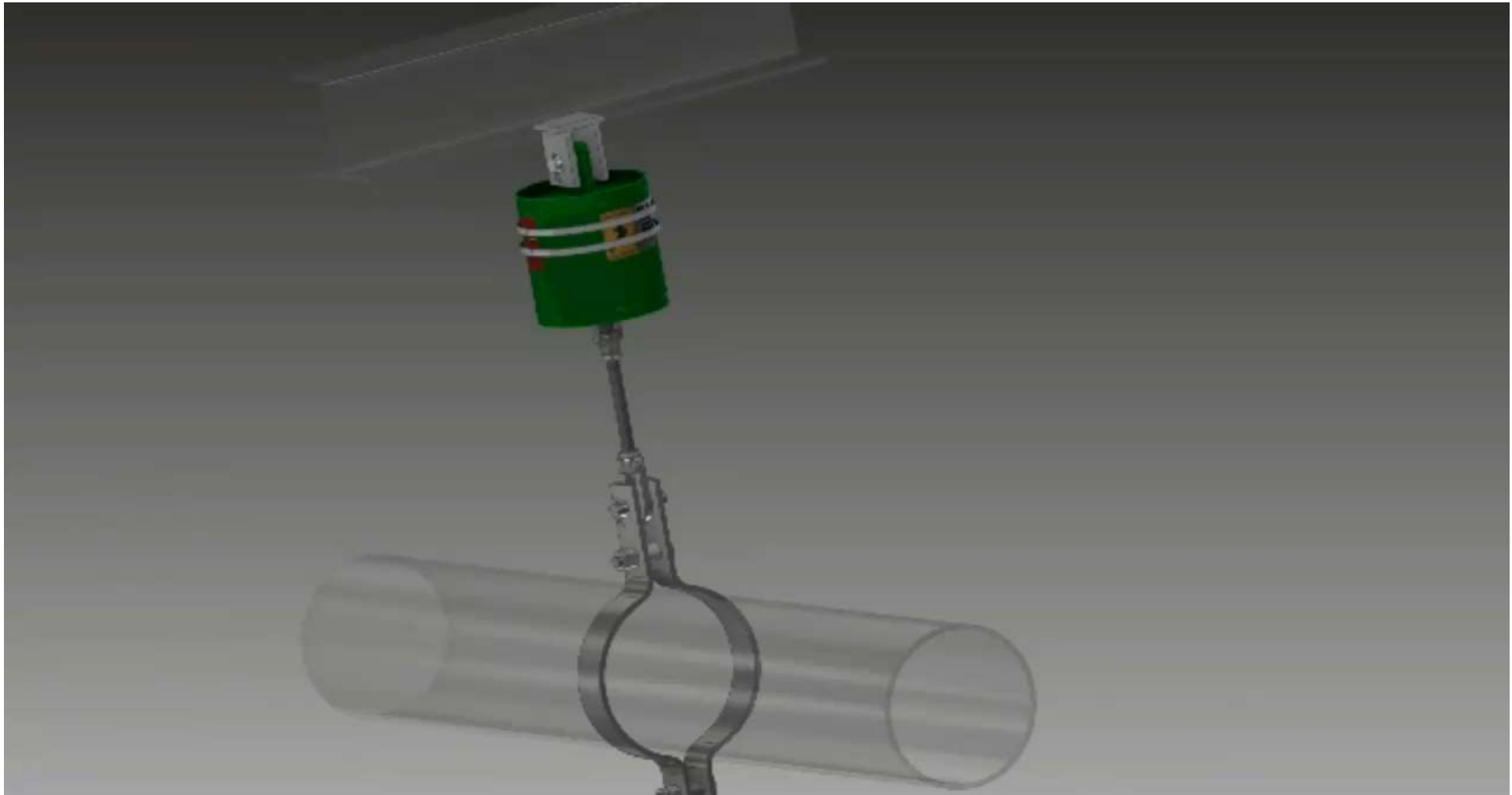
HERE SOME VARIABLE SUPPORTS ARE LAID OUT FOR INSPECTION PRIOR TO PACKING:





HOW A VARIABLE SUPPORT IS ASSEMBLED:

THIS VIDEO ILLUSTRATES HOW A VARIABLE SUPPORT IS ASSEMBLED AND INSTALLED AT SITE:



CONSTANT EFFORT SPRING SUPPORTS



BELL CRANK LEVER DESIGN



**PREFERRED TO VES
IN CERTAIN SITUATIONS**



**STANDARD LOAD CARRYING
CAPACITY UP TO 33,500 KGS**



**STANDARD TRAVEL RANGE
UP TO 610MM**



**FEATURE 'MULTILOCK'
LOCKING RODS**



CONSTANT SUPPORTS LAID OUT FOR INSPECTION

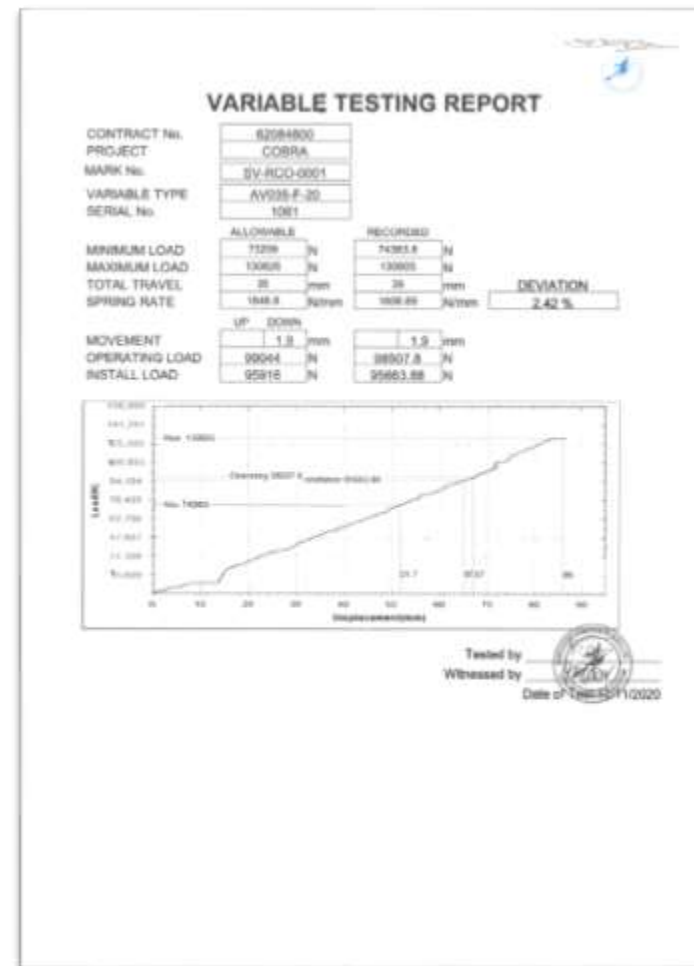
HERE SOME LARGE CONSTANT SUPPORTS ARE LAID OUT FOR INSPECTION PRIOR TO PACKING:





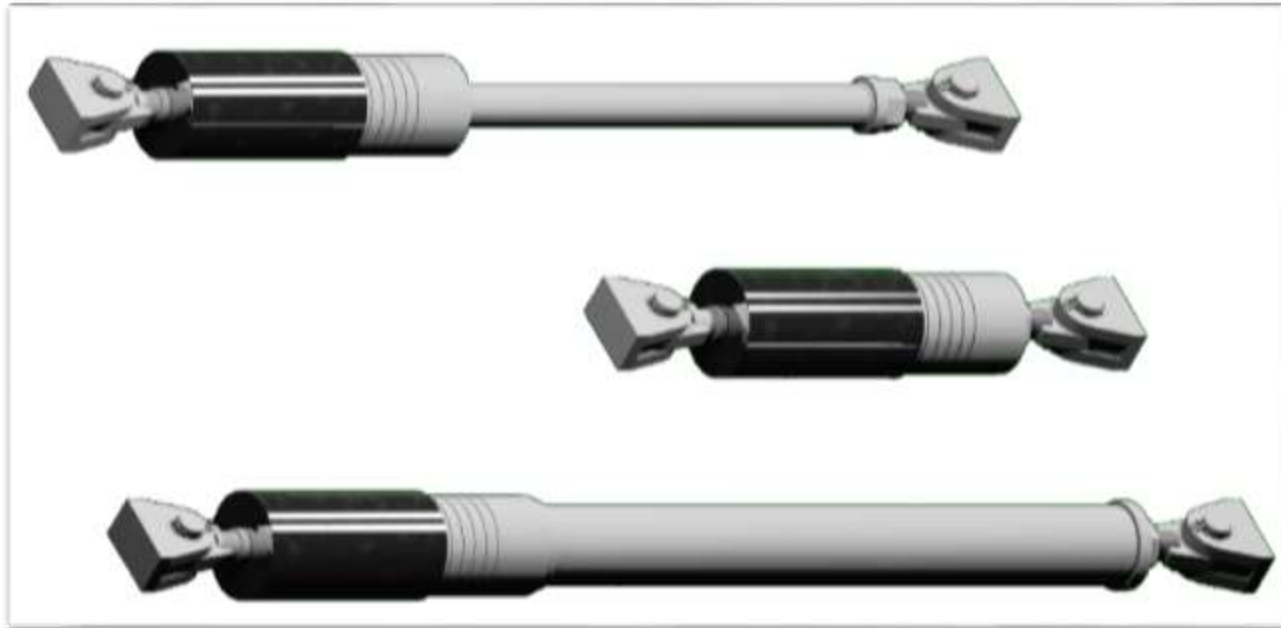
LOAD TESTING OF SPRING SUPPORTS

BEFORE LEAVING OUR WORKS, EVERY SPRING SUPPORTS IS LOAD TESTED AND A LOAD TEST REPORT IS ISSUED TO THE CUSTOMER:





HYDRAULIC SNUBBERS



A HYDRAULIC SNUBBER IS A DYNAMIC RESTRAINT:



DURING NORMAL OPERATING CONDITIONS, SNUBBERS ACCOMMODATE THE REQUIRED DISPLACEMENT OF THE PIPING SYSTEM



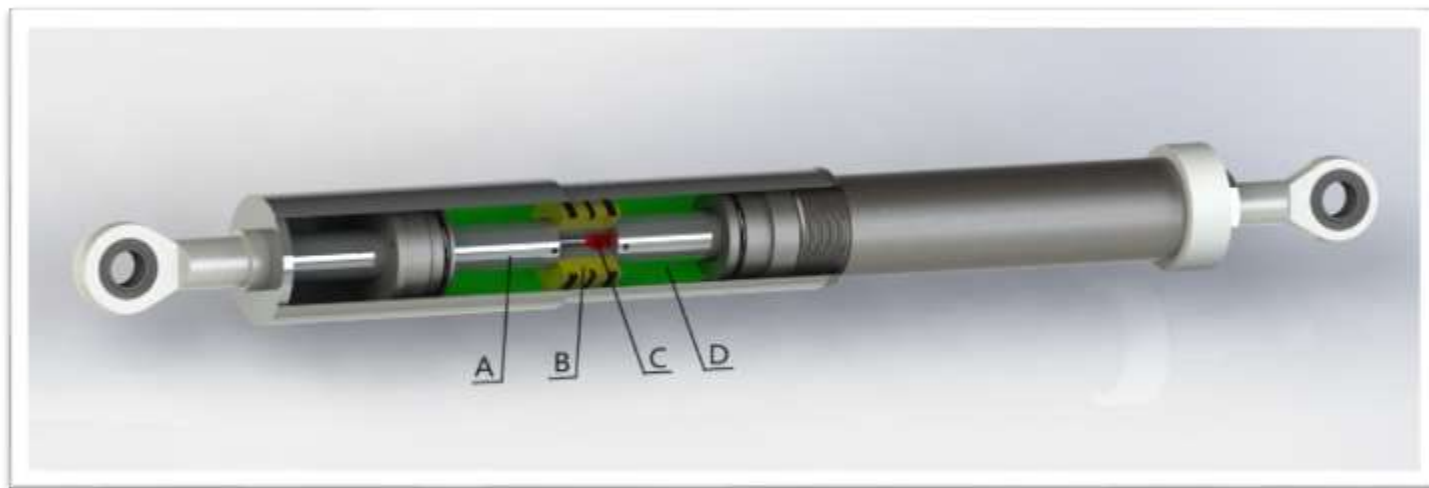
HOWEVER, DURING A DYNAMIC EVENT, (e.g. an earthquake, rapid valve closure, two phase flow or relief valve discharge)

THE SNUBBERS LOCKS THUS PROTECTING THE PIPING SYSTEM FROM EXCESSIVE DEFLECTIONS.



HYDRAULIC SNUBBERS

THE CPA HYDRAULIC SNUBBER FEATURES A 'THROUGH ROD' DESIGN WHICH PROVIDES THE FOLLOWING BENEFITS OVER COMPETITOR PRODUCTS >>



A

PISTON ROD

B

VALVE COMPONENT

C

PISTON COMPONENT

D

OIL CHAMBER



External reservoir not needed. Piston rods on either side of the piston means that the hydraulic fluid volume does not change.



Strong design – the piston rod is supported at both ends to avoid 'knuckling' and subsequent wear on the bearings.



Small diameter – efficient design and no external reservoir results in a compact product.



Enables the snubber to be installed in any orientation



Results in robust product with strong and reliable performance



HYDRAULIC SNUBBERS

HERE IS A SHORT ANIMATION ILLUSTRATING THE SNUBBER'S THROUGH-ROD DESIGN IN ACTION DURING NORMAL OPERATING CONDITIONS:





HYDRAULIC SNUBBERS

BEFORE LEAVING OUR WORKS, EVERY SNUBBER IS LOAD TESTED AND A LOAD TEST REPORT IS ISSUED TO THE CUSTOMER:



Carpenter and Paterson (Asia) Ltd.
 404-406, Jalan 2/10A, Taman Tasik Damansara, Kuala Lumpur, Malaysia
 Tel: +603-2091-1111 Fax: +603-2091-1112
 www.cpa.com.my

Hydraulic Snubber Test Report

Serial No.	270811	Model	CS-80-200
Customer No.		Customer No.	
Rated Load (kN)	80	Tester mm	10
		Range No.	43.5PS-8007-180

Tension Tolerance (kN)	0.612	Compression Tolerance (kN)	0.812
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Tension Lock-up Rate (mm/min)	3.812	Compression Lock-up Rate (mm/min)	2.112
Tension Bleed Rate (mm/min)	0.0	Compression Bleed Rate (mm/min)	0.2
Tension Strain (kN)	81.488	Compression Strain (kN)	78.888
Pass/Fail	Pass	Date	01-20-2017 11:08
Operator		Inspector	
Comments			



HYDRAULIC SNUBBERS

HERE SOME SNUBBERS (AND STIFF CLAMPS) ARE LAID OUR FOR ASSEMBLY AND INSPECTION :





CRYOGENIC SUPPORTS ('COLD SHOES')



DESIGNED TO SUPPORT THE PIPE LOAD & PROVIDE INSULATION TO TEMPERATURES AS LOW AS -196c



OFTEN REQUIRED IN LNG PROCESSING FACILITIES & TERMINALS AS WELL AS PETROCHEMICAL PLANTS



COLD SHOES INCORPORATE HD PUF SHELLS WHICH ACT AS AN EFFECTIVE INSULATING & LOAD BEARING MEDIUM





CRYOGENIC SUPPORTS ('COLD SHOES')



The shells are moulded to the required dimensions using steel moulds which are designed to ensure that the shell dimensions are maintained with high accuracy



The PUF is produced in three densities – 160, 224 and 320 kg/m³. The choice of density depends on the loading of the support.



The PUF can be single layer or multi-layer: when multi-layer, it is 'stepped' to match the layer thicknesses of used on the line insulation.



The PUF layers are also 'stepped' circumferentially to ensure that there is no direct path for heat transfer between the pipe and the outside of the insulation



COLD SHOE COMPONENTS



A steel cradle is welded to a steel log of box construction – which is an inherently strong design



The cradle halves are bolted together & disc springs are used to ensure that a clamping force is maintained as the pipe radially contracts after cooling to cryogenic temperatures



The PUF shells sit within the steel cradle



To ensure any moisture cannot penetrate the insulation, the outer layer of PUF is covered with Mylar foil – a polyester-aluminium laminate.



The Mylar foil is protected with a metallic jacket



HOT SUPPORTS ('HOT SHOES')



Hot shoes are pipe shoes which incorporates a layer of load-bearing insulation – often calcium silicate – between the pipe and the shoe.



Therefore, pre-insulated hot shoes support the pipe load whilst providing excellent thermal insulation up to temperature of 1100c



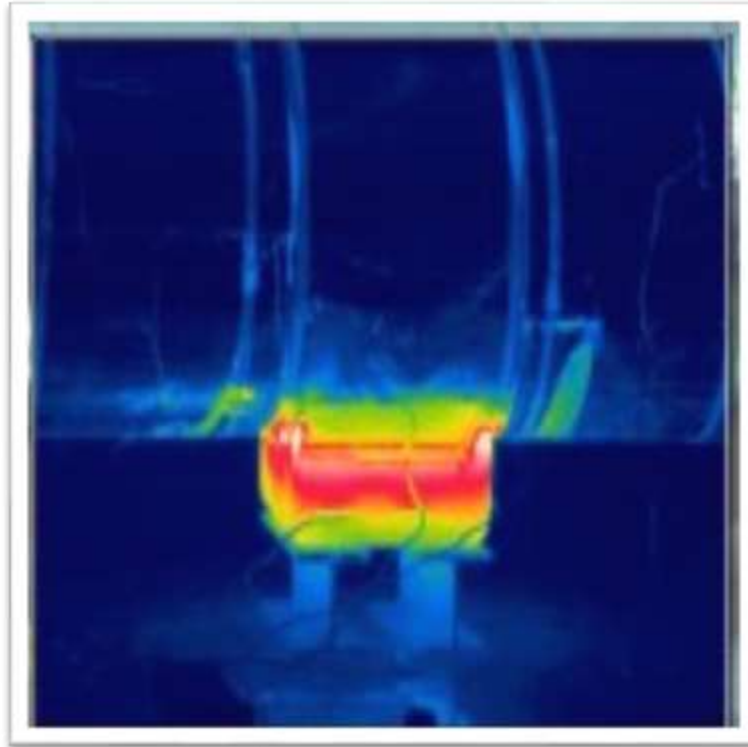
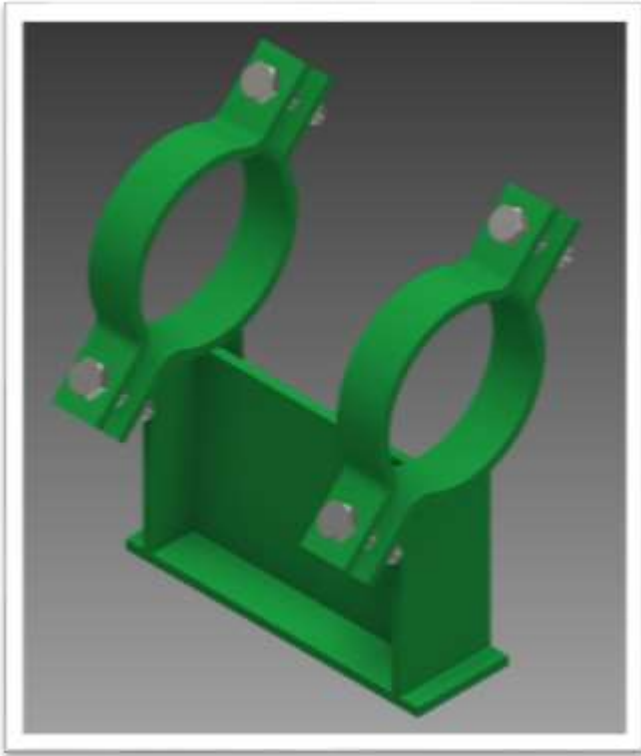
This minimises heat loss at the support location and provides significant energy and cost savings.



Furthermore, given that the steel shoe is not in direct contact with hot pipework, the shoe can be manufactured from carbon steel – a much cheaper alternative to the alloy or stainless steel.



DISADVANTAGES OF STANDARD PIPE SHOES ON HOT PIPEWORK



X

With standard pipe shoes, there is a direct path for heat conduction through the leg of the shoe to the support steelwork. This results in large losses of heat and reduction in thermal efficiency of the pipework.

X

Given that standard pipe shoes are in direct contact with the pipework, it needs to be manufactured from similar material – often alloy or stainless steel for hot pipework – which is significantly more expensive than carbon steel.



HOT SHOES – TYPES OF PRE-INSULATION



CALCIUM SILICATE



AEROGEL



**FOAMGLAS
(FOR DUAL TEMPERATURE PIPING)**





CALCIUM SILICATE HOT SHOES

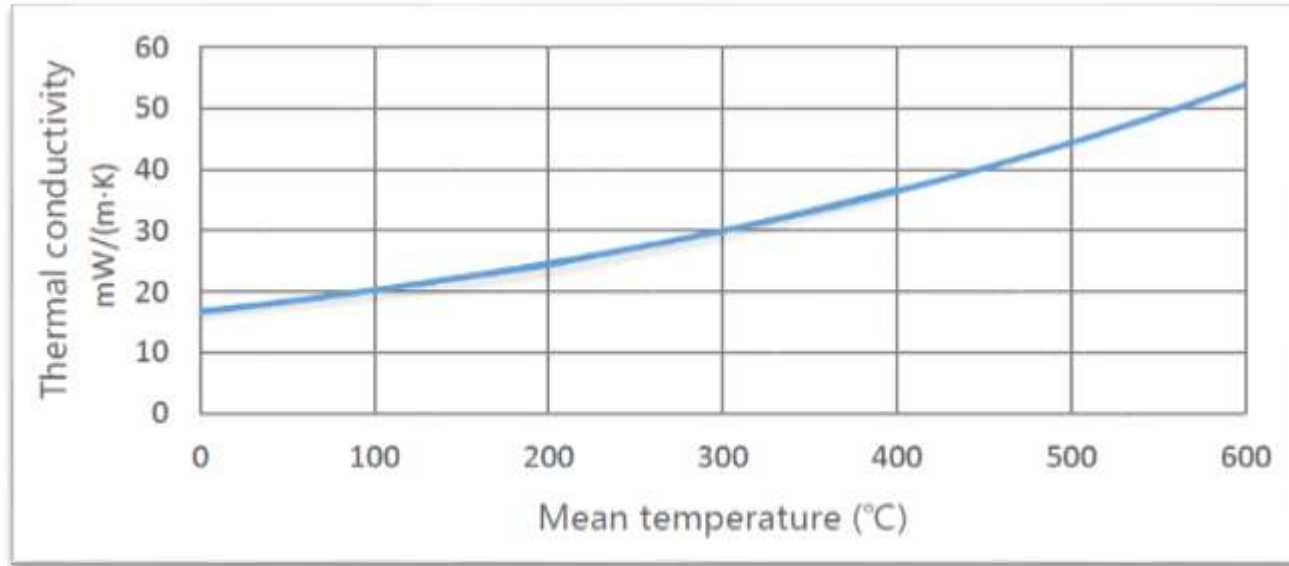
Material Grade	Density	Compressive Strength	Thermal Conductivity
	kg/m ³	MPa	W/m.K
Promasil 1100	285	2.5	0.075
Promatect-L	450	3.9	0.083
Promatect-L500	500	4.04	0.095
Promatect-MST	750	18	0.230
Monolux	950	25	0.260



CPA choose between several densities of calcium silicate when designing hot shoes. The higher density materials have higher strength but also higher thermal conductivity i.e. they are not as good insulators.



AEROGEL HOT SHOES



Operation temperature	-50~650°C
Thermal conductivity	0.018W/(m·K)
Density	150 – 200 kg/m ³
Hydrophobicity	>99%



Aerogel is a synthetic ultralight material derived from a gel. It has very low thermal conductivity. For this reason it is increasingly being used for pipe insulation in industrial plants where high thermal efficiency is desired.



Where the pipework is insulated with Aerogel, designers often want the supports to also be based on Aerogel.



Aerogel has low compressive strength. In hot shoes, high strength inserts are used to carry the loads acting at the support.



FOAMGLASS HOT SHOES



In process plants, pipework sometimes needs to be designed for both cold and hot operating conditions. PUF insulation is not used above about 130°C and calcium silicate is not used below zero. Where neither of these materials meets the required temperature range, the type of insulation most commonly used is Foamglas.



Foamglas is suitable for use from cryogenic temperatures up to 400°C



HOT SHOE LOAD TESTING



As part of the design verification process, we have carried out full-size load tests. On the left, a 14" hot shoe is tested at CPA. The shoe is subjected to vertical, lateral and axial loading.

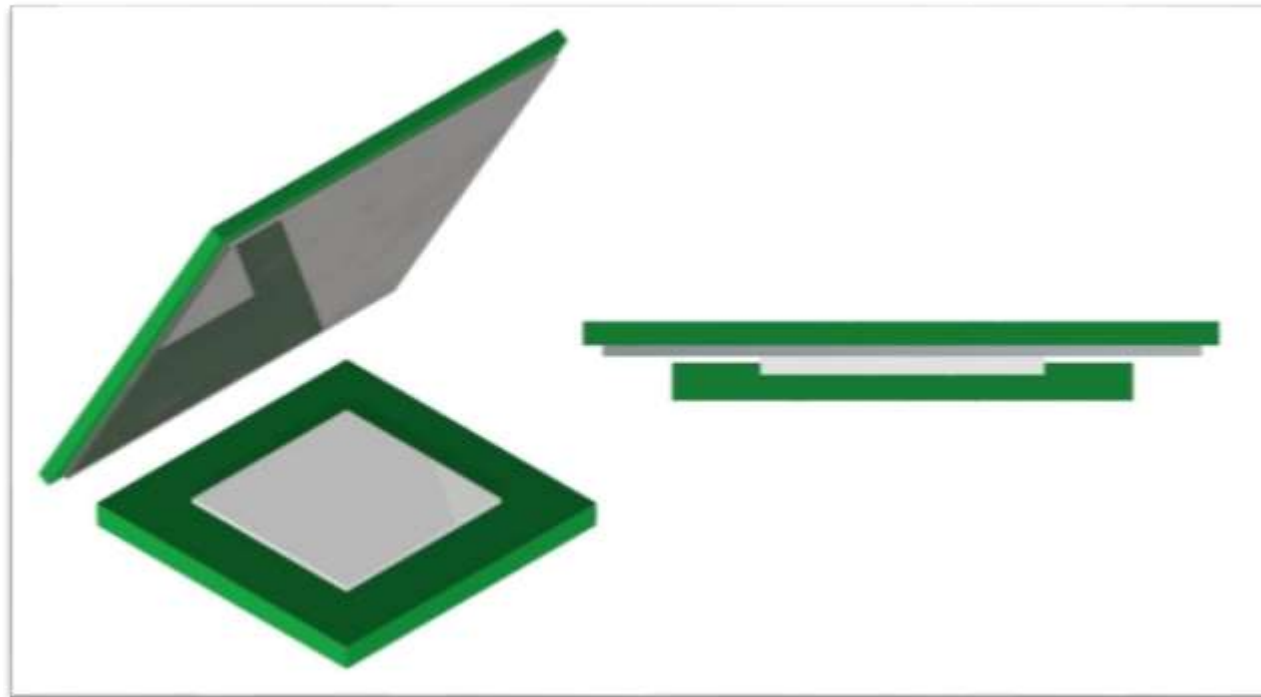


CPA has also carried out testing on hot pipes under load to verify the thermal and load-carrying performance of Aerogel Hot Shoes.





PTFE SLIDE BEARINGS



Low friction device which accommodates the lateral and/or axial movement of supporting structures.



A slide bearing assembly typically consists of:

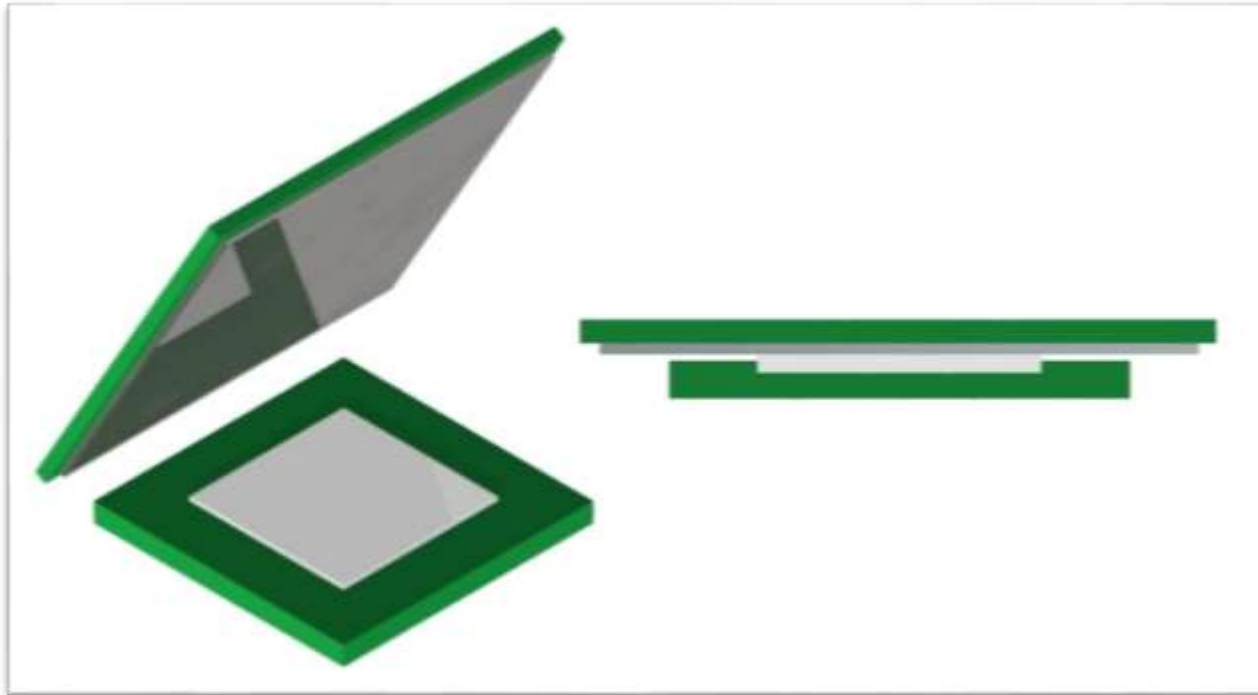
- **Lower PTFE slide plate w/ CS backing plate**
- **Upper ST ST slide plate w /CS back plate**



PTFE possesses the lowest coefficient of friction (<0.1) of any solid material, thus enabling the stainless steel plate to slide easily against the PTFE material.



STANDARD BEARING ASSEMBLIES



Bonded PTFE:

- 3mm thick PTFE bonded to an 8mm thick backing plate
- Max temp at the sliding face of 130c.



Recessed PTFE:

- 5mm thick PTFE in a recessed backing plate.
- Max temp at the sliding face of 200c and allows increased bearing pressure.

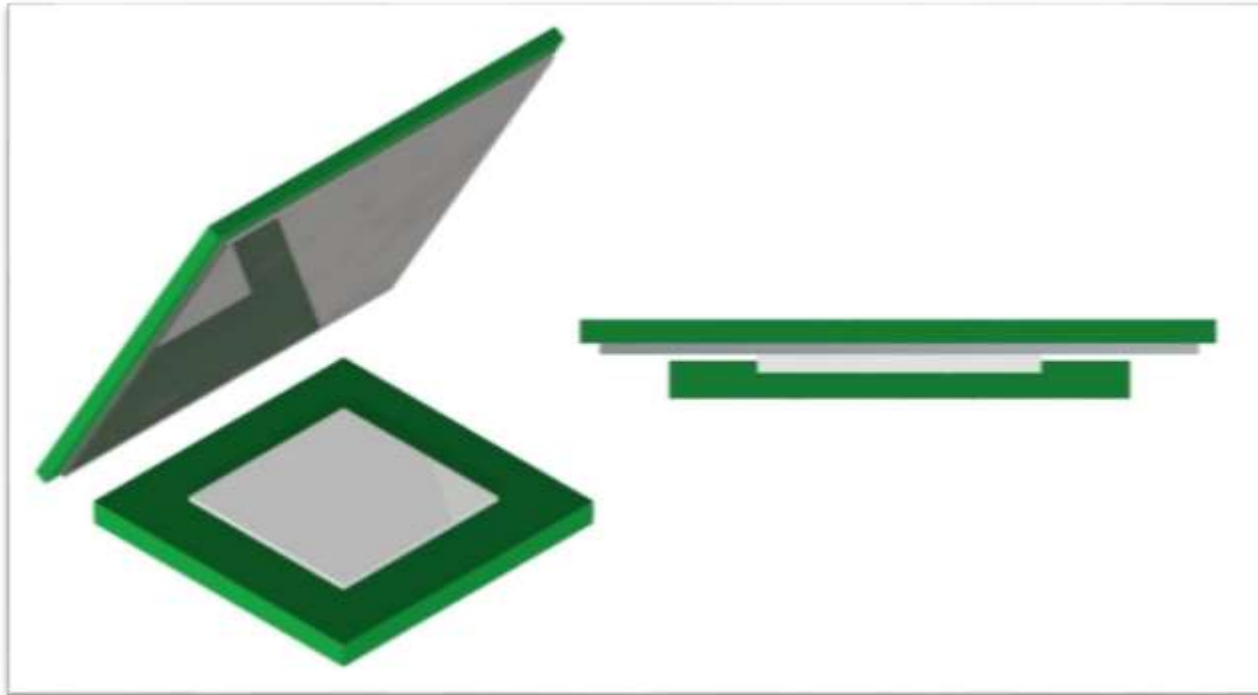


Recessed Graphite:

- 5mm thick Graphite in a recessed backing plate.
- Max temp at the sliding face of 400c (and up to 500c if backing plate is alloy/stainless steel).



ADVANTAGES OF CPA SLIDE BEARINGS



The simplicity of the bearing design and its ease of fabrication and installation make the unit cost efficient



The costs of a construction can be reduced by designing for expansion rather than strain.



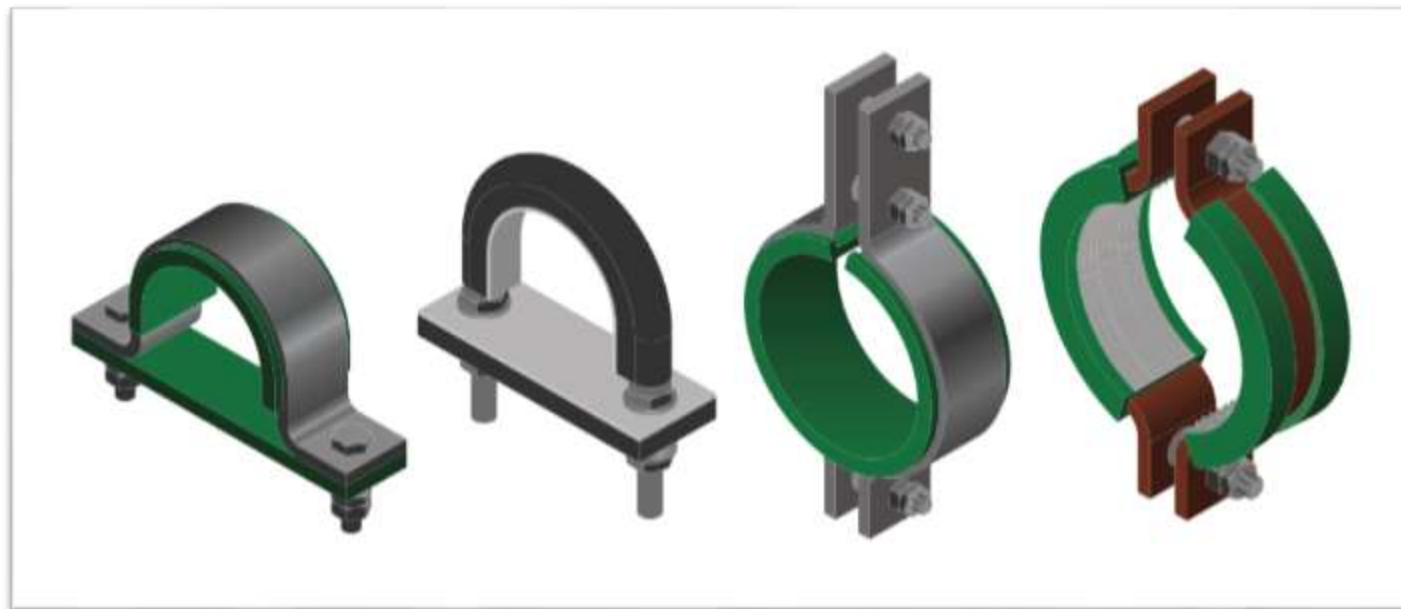
Coefficient of friction over the bearing surface remains constant, even under worst case conditions



The bearings are maintenance free – both PTFE and graphite are inherently self-lubricating, while PTFE will absorb small dirt or grit particles.



WITCHLINER ISOLATION MATERIAL



PRINCIPAL BENEFITS:



Prevention of electrolytic erosion between dissimilar metals



Curtailment of noise and vibration



Resistance to ozone, weathering, oils and solvents



Prevents clamping damage to thin wall pipes



TYPES OF WITCHLINER MATERIAL

70/80 FRN:

Properties of 70/80 FRN		
Hardness Shore	A	65
Density	kg/m ³	1320
Tensile Strength	MPa	6
Elongation	%	575
Min Service Temp	°c	-30
Max Service Temp	°c	120

HT/FR SILICONE:

Properties of HTFRS		
Hardness Shore	A	63
Density	kg/m ³	1390
Tensile Strength	MPa	6.4
Elongation	%	190
Min Service Temp	°c	-40
Max Service Temp	°c	300

78/80 FR Neoprene:



Temperature range -30°c to 120°c

HT/FR Silicone:



Temperature range -40°c to 300°c



'WITCH-HANGER' PIPE SUPPORT DESIGN SOFTWARE



CPA's proprietary 2D pipe support design software



Used by CPA designers and free of charge to CPA customers



Quick & efficient design of Constant & Variable spring support assemblies, Rigid Hangers & Dynamic Restraints



Automatically selects the most economic spring unit, calculates hanger rod lengths and provides complete project MTO

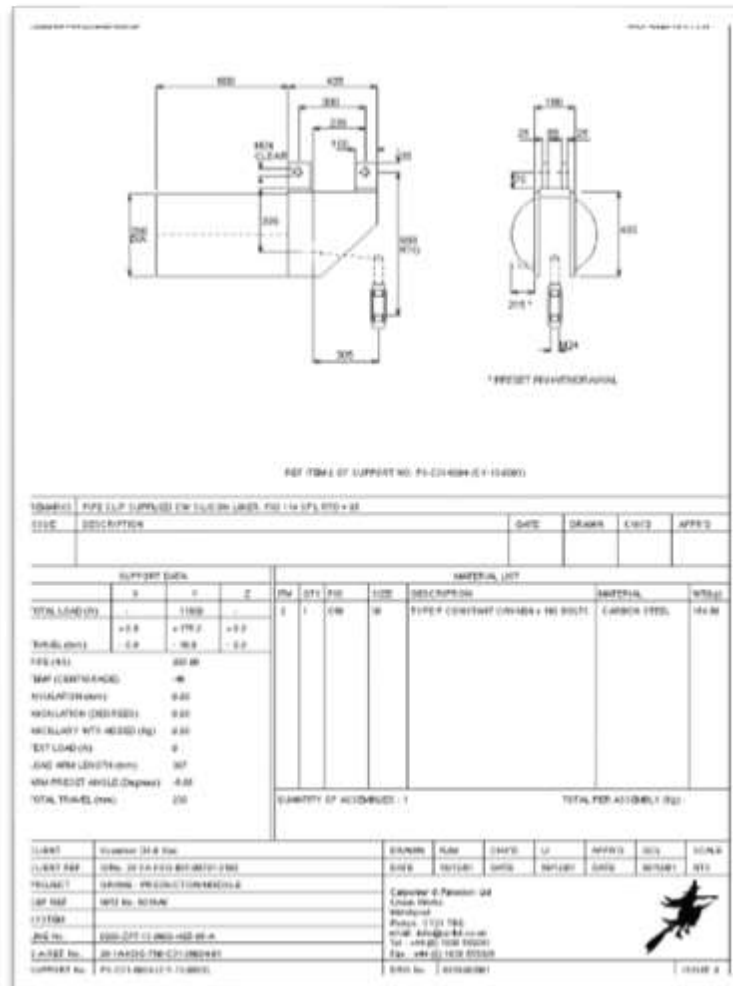
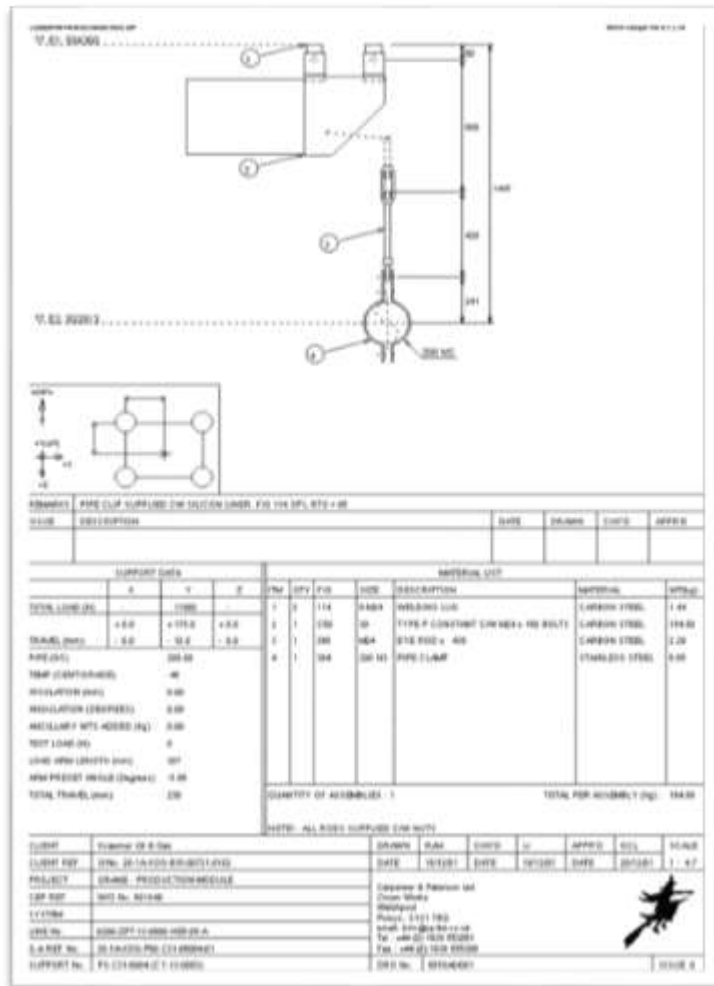


Interfaces with CAD packages & 3D plant modelling software packages such as PDMS, E3D and SP3D



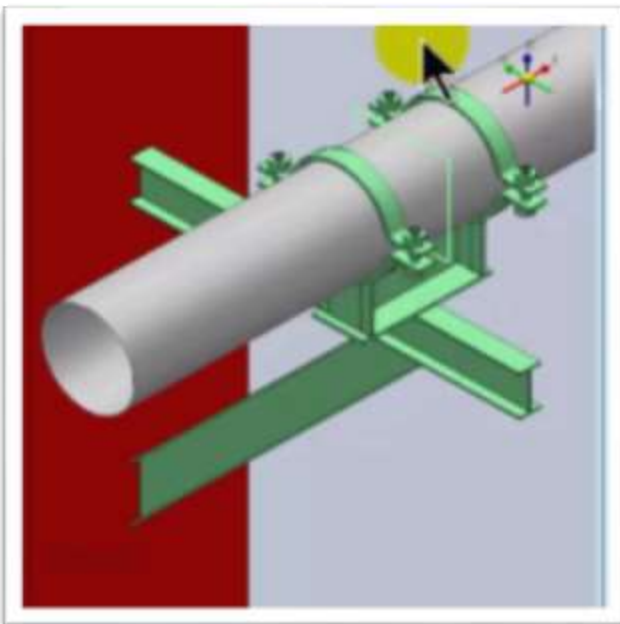
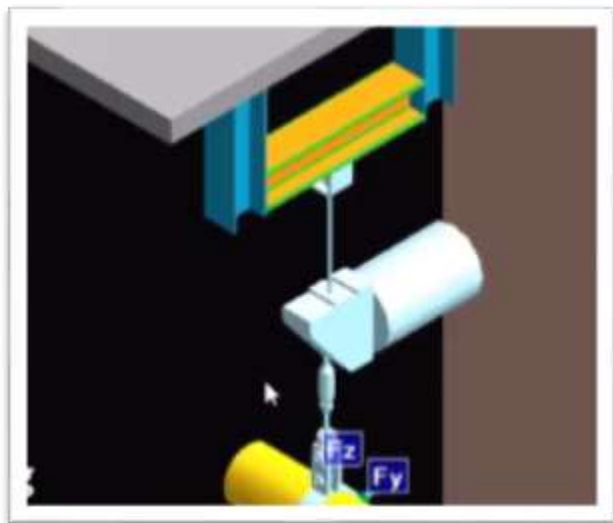
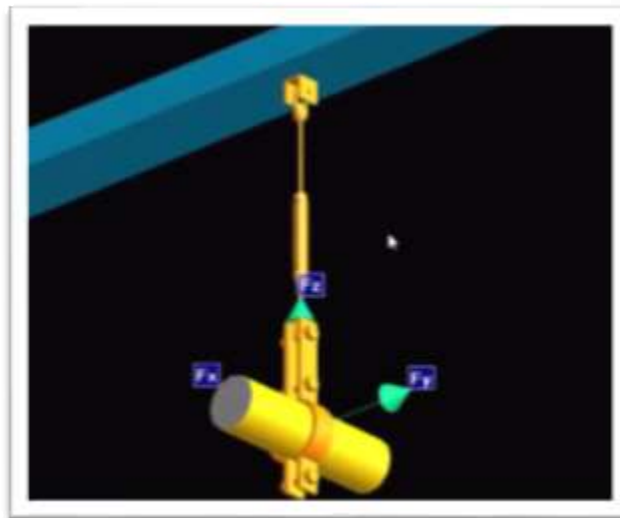
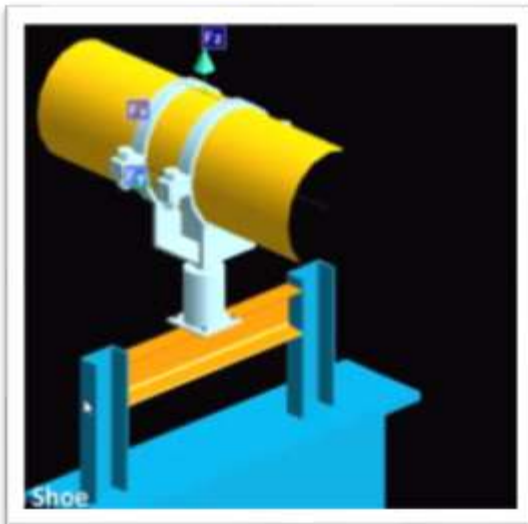
'WITCH-HANGER' DRAWINGS

HERE ARE SAMPLE 'WITCH-HANGER' DRAWINGS OF A CONSTANT SPRING SUPPORT ASSEMBLY:





3D PIPE SUPPORT DESIGN



An effectively designed pipe support system ensures safe and efficient operation of the plant



CPA offers pipe support design services for a wide range of pipe support systems



Early participation of trained Engineers and Designers:

- ensures timely recognition of any issues
- ensure efficient design of pipe support systems
- avoids costly site modifications



The design are integrated within the customers 3D design software



THANK YOU

www.cpa-pipesupports.com