

Power at Work

Lifting & Positioning Solutions for Industries Worldwide



POWER JACKS

RELIABILITY DEMANDS ABSOLUTE QUALITY.

2 That's why you'll find Power Jacks quality working away in a wide variety of places and industries across the world. The kind of critical applications where leading companies Audi, BMW, British Airways, Dupont, Ferrari, Kodak, Motorola, Rolls Royce, UKAEA and Volkswagen know that nothing but the best will do.

From nuclear power stations to recycling plants, hospitals to dams, sports stadiums to manufacturing plants, Power Jacks is there.

Quietly getting the job done.

The Power of experience

Power Jacks brings over a century of engineering experience to the design and manufacture of precision linear actuation, power transmission and mechanical jacking technology.

Our Scottish factory supplies screw jacks, electric linear actuators and bevel gearboxes. Available as single components or complete systems, in standard or specially engineered form.



INDUSTRIAL AUTOMATION



Changing natural resources into primary products. Most products from this sector are considered raw materials for other industries. Major businesses in this sector include agriculture, aluminium, food processing, metal processing, paper, plastic, printing, steel, textile and wood.

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“Power Jacks have provided us with an excellent service throughout...”

Roger Hughes
Commercial Director
The Composting Company Ltd

STEEL

Laiwu Steel Heavy Plate Steel Mill

Chinese Steel manufacturer, Laiwu Steel, Produces 7M tonne per year.

Laiwu Steel section steel 4300mm heavy plate mill is composed of a 4 slab continuous casting machine and a heavy plate mill. This is the largest rolled plate production line of Laiwu Steel.

The fast cooling tables on the plate mill use 16 x B075 Electric Linear Actuators and 16 x E-Series 300kN Screw Jacks driven via 20 x bevel gearboxes, driven by 8 electric motors.



Aluminium



Anode Beam Positioning on Reduction Cell (Potline)

Power Jacks has supplied numerous anode jacking systems to smelters including the UK, Germany, Norway, USA, Iran, New Zealand, South-Africa and most notably UAE.

Designed to meet each customers' specific requirement whether for Pre-Bake or Söderberg technology based smelters. Our systems are designed and manufactured to deliver at least 30 years of trouble-free operation.

Products Used:

- Screw Jacks
- Bevel Gearboxes
- Reduction Gearboxes
- Electric Motors
- Couplings & Drive Shafts

Agriculture



In-Vessel Composting (IVC) Plant Roof Lift

An In-Vessel Composting (IVC) Plant processes biodegradable household and commercial material to produce a quality compost.

Using a jacking system to lift and lower the roof of a composting vessel. This allows access for the loading when opened, and provides a small void space above the material to allow for better control over the process when closed. The roof has two individually motorised screw jack systems, synchronised electronically. That raises and lowers the roof in less than a minute.

Products Used:

- Screw Jacks
- Electric Motor
- Drive Shafts & Couplings

Food Processing



Beverage Can Production Line

The automated solution for height adjustment of 4 wash tanks uses 28 screw jacks each rated at 10kN load capacity. Model TE2500 inverted translating screw jacks were selected from Power Jacks standard program of E-Series Metric Machine Screw Jacks with some small customisations. Stainless steel components were used to suit the mildly corrosive application environment.

Products Used:

- Screw Jacks
- Bevel Gearbox
- Couplings, Drive Shafts, Hand Wheel

Metal Processing



Metal Section Straighteners

Variable Centre Straighteners utilise Power Jacks components for moving the centre straightening rollers, end pinch rollers.

A jacking system for each straightening roller has two special design screw jacks and a strengthened gearbox and rated for a 700kN dynamic capacity in compression. The pinch rollers have their position adjusted by two horizontally opposing screw jacks, driven individually by motorised helical gearboxes

Products Used:

- Screw Jacks
- Bevel Gearbox
- Electric Motor
- Reduction Gearbox
- Couplings & Drive Shafts

Glass



Glass Packaging Machine

Raising and lowering a carriage clamping mechanism on a glass packaging machine, which operates on a continuous duty cycle.

4 off Power Jacks 100kN E-Series metric translating screw jacks, linked in an H configuration, fitted with two start screws and high performance gear sets, to meet the speed and duty requirements.

Products Used:

- Screw Jacks
- Bevel Gearbox
- Reduction Gearbox
- Electric Motor
- Drive Shaft, Couplings

Paper



Paper Machine

Adjustment on the head box of a paper machine. Two jacks are mounted horizontally and two vertically, to move the slice body, which controls the thickness of the finished paper product.

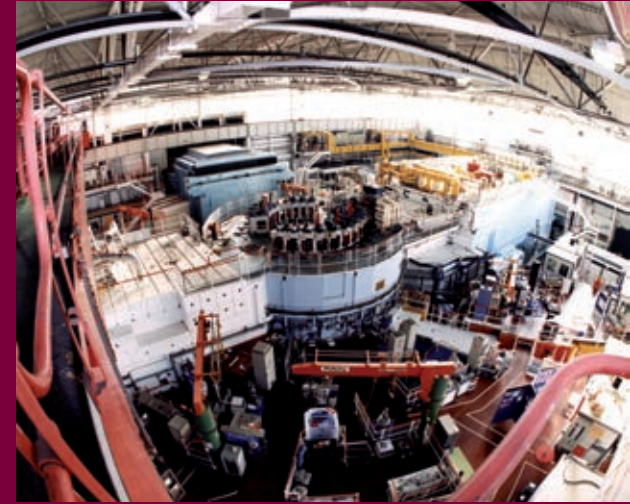
Power Jacks 100kN E-Series metric translating and rotating screw jacks, with special stainless steel screws, worm shafts and cover pipes and fitted with an anti-backlash feature.

Products Used:

- Screw Jacks

ENERGY

Industries involved in the production and sale of energy, including fuel extraction, manufacturing, refining and distribution. This includes nuclear, oil, gas, electricity, solar, wind, wave and research.



The screw jacks have successfully operated over the last twenty years helping scientists to complete their experiments. Over this time Power Jacks has provided a continuous after sales support service, which extends to maintaining spares availability.

RESEARCH

ISIS Pulsed Spallation Neutron-Target Station Door Mechanism



At the target station there are 18 beam channels, each with a 30 Te shutter mechanism used during experiments. Each shutter is operated by a Power Jacks 300kN E-Series Metric Machine Screw Jack type E1829 driven by a 7.5kW geared motor.

The screw jack has an inverted translating screw configuration with 500mm of stroke and 16mm lead driven by a 32:1 worm gear set. The standard design was customised to meet the exact customer installation and operation requirements. The special features ranged from large components such as a special lead screw to nuclear grade grease for screw and gear set lubrication.

Electricity



Raise & Lower Power Station Dampers

Raising and lowering dampers in power station flues, to enable maintenance to be carried out without disrupting power generation.

2 x 200kN screw jacks with 4 metre screws, cross linked with a drive shaft and couplings.

Products Used:

- Screw Jacks
- Reduction Gearboxes
- Electric Motors
- Limit Switches

Nuclear



Nuclear Container Handling System

To displace via tilt and slew motions, the slave arm relative to the master arm, on manipulators for handling radioactive material. The actuators also act as load bearing struts, carrying the full reaction loads.

Two electric linear actuators, 2.5 kN and 5 kN, 24v DC actuators on each manipulator

Products Used:

- Electric Linear Actuators

Oil & Gas



Subsea Choke Part of Flow Control

At a depth 3000 metres below sea level, Power Jacks Neeter Drive, bevel gearboxes are in operation on subsea single bolt clamp connectors on subsea retrievable chokes. The chokes are operated by Remote Operated Vehicles (ROVs). Most have inline drive shafts for adjustment, however for some installations the clamp connectors adjusting drive shaft needs to be at 90° for ROV access. Rather than redesigning the complete clamp mechanism a "Neeter" gearbox solution is required.

Products Used:

- Bevel Gearbox

Oil & Gas



Hydrostatic Pressure Vessel : Test Facility - Lid Lift

Screw jack system raises & lowers the 35-ton access lid. Special units, based on the E-Series 300kN Metric machine screw jack, with motorised reduction and bevel gearboxes to distribute power to drive each of the four screw jacks. The motor included an integral brake for secure load holding.

Products Used:

- Screw Jacks
- Bevel Gearboxes
- Reduction Gearboxes
- Electric Motors (Braked)
- Drive Shafts, Couplings & Limit Switches

Research



Joint European Torus Project (JET)

A positioning manipulator used in partnership with the tokamak machine has the ability to carry out key operations such as removing & replacing outer wall beam limiter plates.

The 200kN E-Series screw jack for the side tilt mechanism pivots the arm radially around the central axis along the length of the arm. Anti-backlash screw jacks were specified to minimise positioning error at the end of the manipulator, as movement is magnified along the arm.

Products Used:

- Screw Jacks

Solar Energy



Solar Positioning Systems

For photovoltaic (PV) or concentrated solar power (CSP) technology based solar power plants it is advantageous for the PV cell or CSP mirror to track the sun to provide the highest electricity yield. Power Jacks solar positioning solutions are customer specific and our range of screw jacks and linear actuators can accommodate even the biggest of tracking systems.

Power Jack products have a proven record in arduous environments, delivering quality trouble-free operation for decades.

Products Used:

- Screw Jacks
- Electric Linear Actuators

APPLICATIONS

TRANSPORT

Manufacture of the machines that move people and goods from one location to another performed by modes such as air, rail, road, water and space. Industry sectors include automotive, railway, aerospace.



“The improvement was dramatic”

Jim Brownrigg
Conversion Manager
Rexam Beverage Can UK

AEROSPACE

Lift for Aero Engine Transport



The multi-functional modular stand allows an aero engine to be moved short distances or transported worldwide. One example is the Trent 500 & 700 engines typically used on Airbus A340-500, A340-600 and A330 family.

A three point lift system was devised using three screw jacks, bevel gearboxes, couplings and drive shafts. The system was designed to be quick and easy to use by hand operation while being self-locking.

Using 50kN E-Series metric machine screw jacks of the type KTE1805 were used. The 24:1 gear ratio combined with the 9mm lead on the screw provided a mechanism that was self-locking and minimum torque input for hand operation. Worm shafts are chrome plated and the screw is protected by a PVC bellows boot for protection and anti-corrosion. The system also uses two Neeter Drive range-N series 35 bevel gearboxes with a 3-way solid shaft and 1:1 gear ratio.

Aerospace



Jumbo Jet Tail Dock Maintenance Platform

For aircraft maintenance access Power Jacks screw jacks are ideal for raising and lowering levels/ platforms. The screw jacks can be individually motorised or driven as a mechanically linked system. Safety features that can be employed include safety nuts, brakes and wear monitors. The picture above shows jacking systems lifting the aircraft access structure (tail dock) for a jumbo jet.

Products Used:

- Screw Jacks
- Bevel Gearboxes
- Electric Motor
- Reduction Gearbox
- Couplings, Drive Shafts

Automotive



Paint Pump

Our electric linear actuator was selected to drive the reciprocating, double acting paint pump. A total of 31 pumps and actuator systems are in use at the paint shop at BMW Mini Oxford, which was the first all-electric paint mix facility in Europe. The linear actuator has a proven track record of quality and reliability under high operational demands.

Products Used:

- Electric Linear Actuators

Railway



Railway Carriage Lift

All railway carriage bogie drop and jack systems are designed to be extremely strong, simple and very safe. Power Jacks provided two 500kN E-Series metric machine screw jacks for the lifting mechanism on this system installed in Australia.

Products Used:

- Screw Jack

Aerospace



Image: © Crown Copyright/Mod/RAFAT

Aircraft Access Platform

Improving the access platform used by pilots to enter and exit the cockpit of their special jet airplanes. These platforms need to provide a safe access route to the cockpit that can be adjusted to the right height for each plane given varying ground conditions and pilot size. Once in position these platforms must lock securely and safely to prevent any accidental damage to the plane occurring.

Products Used:

- Screw Jacks
- Bevel Gearboxes
- Drive Shafts and Couplings

Automotive

**Sheet Metal Bundle Turnover Machine**

Bundle turnover machine installed in a Ford car plant, which moves cut sheet metal from the horizontal position to the vertical.

Six Power Jacks E-Series worm gear screw jacks position the clamps for holding the sheet metal during the rotation. The screw jack used was the 100kN (10 tonne) ME1809 metric machine screw jack in inverted screw configuration. Associated drive shafts and flexible couplings were also provided.

Products Used:

- Screw Jacks
- Electric Motor
- Couplings, Drive Shafts

Automotive

**Paint Booth Spraying Nozzles**

Controlled movement and indexing of paint spray nozzles in streamlined spray booth. Units needed reliability for working in an environment that required the units to work up to 16 hours a day continuously.

Neeter Drive Range N, Series 38, Ratio 1:1 bevel gearboxes selected for compactness of design and high reliability and precision, units sealed for life to allow for minimal maintenance.

Products Used:

- Bevel Gearbox

CIVIL

The design, construction and maintenance of facilities and provision of services that people use everyday including medical, sports stadiums, communication network, bridges, roads, canals, dams, water processing, waste services and public buildings.



“Reliability was always the key issue when considering which equipment suppliers to use on the roof. We chose Power Jacks both as a result of the numerous successful projects that we have used their equipment on in the past and because of their ability to meet our demanding specifications”.

Daniel Salthouse
Project Manager for SCX
Wimbledon Centre Court Roof Project

LEISURE - SPORTS

Wimbledon Centre Court Roof



Selected by SCX as a prime technology partner, Power Jacks designed, manufactured and supplied 42 bespoke electric linear actuators, 36 of which operate when the roof opens and closes.

These linear actuators used for locking and unlocking the roof segments were specially designed using 3D design technology to optimise the design process and integrate with SCX. The actuators design, with a peak load rating of 160kN operate at 1500 mm/min over a 400mm stroke with the useable stroke set by integrated limit switches and finished in classic Wimbledon white. Drive is provided by an electric brake motor with an IP66 weatherproof enclosure. The completed electric linear actuator is mounted using a trunnion to clevis type arrangement that allows pivoting through an arc during its operation.

The roof closes in under 10 minutes with play resuming in approximately 20 minutes, giving media companies the ability to broadcast almost unbroken coverage of play.



Communication



Satellite Dish up to 18m Diameter

Antenna dish for major communication systems, transmitting television programmes, telecommunications and business data. Power Jacks screw jacks for accurate positioning of elevation and azimuth of large antenna dishes. Low axial backlash and high stiffness are required to maintain antenna dish on station under high fluctuating wind loads.

Products Used:

- Screw Jacks
- Electric Motors
- Reduction Gearboxes
- Limit Switches

Medical



Full body, multi purpose X-Ray : examination table

Two of Power Jacks B100 linear actuators, both parallel drive configurations with ball screw drive, are fitted on each x-ray table and they are synchronized for horizontal and vertical positioning through a complex servo control system. Tested to withstand 8 times the maximum load, without catastrophic failure and producing only minimal noise. Compact design and conforms to strict aesthetic criteria.

Products Used:

- Electric Linear Actuators

Leisure - Sports



F1 FERRARI Team Operations: Trailer Roof Lift

The trailers 8 Tonne roof was raised and lowered using a high performance machine screw jacking system. In each corner of the trailer there is a motorised screw jack with integral absolute encoder for position feedback. All four screw jacks were electronically synchronised via an inverter based control system. Manufactured for Procar International on behalf of their client Ferrari.

Products Used:

- Screw Jacks

Civil Engineering

**Fail-safe operation of tunnel ventilation dampers**

This actuator is a special design with a pre-loaded spring and fitted with a high temperature brake motor. The internal spring and drive configuration allows the ram to retract automatically in the event of power failure. Three adjustable limit switch positions are provided and the stroke can be set within allowable 120mm, by adjusting these switches. Fire tested for operation at 250°C for 1 hour.

Products Used:

- Electric Linear Actuators

Water

**Rother Salmon ladder**

The velocity of the water over the ladder must attract the salmon to the ladder, but not so great that it washes the salmon back downstream or cause exhaustion.

The water flow rate over the ladder is adjusted by two 50kN E-Series rotating screw jacks with stainless steel lead screws and synchronised drive from a single electric motor.

Products Used:

- Screw Jacks
- Electric Motors
- Drive Shafts, Couplings, Limit Switches

Water

**Weir gate Positioning for Water Level Adjustment**

Due to its remote location, an electro mechanical solution was preferred over hydraulics due to low power requirements, no expensive hydraulic power pack and no hydraulic fluid leakage ie no water contamination.

An R175 linear actuator is used for moving a dynamic load of 150kN at 240mm/min over a 2700mm stroke while being able to sustain a static load of 330kN.

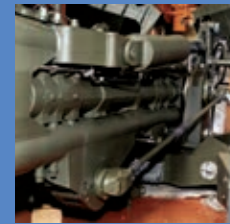
Products Used:

- Electric Linear Actuators

DEFENCE

Comprising government and commercial industries involved in research, development, production, and service of military equipment and facilities for land, sea and air operations.

20



The M777 Howitzer is substantially different from any other gun, as it is designed to be ultra lightweight to allow the US Marines to fly the gun in by helicopter; the gun utilises an extensive range of lightweight materials including aluminium and titanium.

LAND

M777 Howitzer



Custom Neeter Drive Range-N

Power Jacks provides three specially designed ultra compact and lightweight bevel gearboxes for the M777 howitzer. Two of the bevel gearboxes are power driven and the third uses a hand wind facility, all units are used in the elevation of the gun, prior to its use.

The Howitzer had been in development for over 3 years and a further 5 years working closely with BAE Systems (VSEL) to ensure that the units meet the design requirements. Developed with BAE Systems with extensive testing and trials.

Three units are supplied per Howitzer, each one different, two are based upon the standard N35 gearbox design and the third is a bespoke design based around a set of N35 gears. Many different prototypes were manufactured and tested in vigorous terrain and weather conditions, each design slightly different until the final design was settled upon.



Air



Aircraft Maintenance Platform

Installation of a jacking system at RAF Brize Norton which lifts one of the levels of a aircraft maintenance platform up and down.

The jacking system consists of 5 x Special DE1811 E-Series machine screw jacks arranged in a "U" configuration with 2 x Neeter Drive Range-N 35-Series bevel gearboxes and 1 x 37-Series bevel gearbox. All driven by a 5.5kW electric motor.

Products Used:

- Screw Jacks
- Bevel Gearboxes
- Electric Motor

Land



Image: © Sgt Gerry Pilote

Flail Assembly

Gearbox to drive the flail assembly of land mine clearance vehicle.

Range N, Series 40, Ratio 2:1 bevel gearbox unit was selected for its compactness for mounting in the flail drive, however the unit needed greater power than the standard unit. Up rated gears were designed and fitted. Unit design also capable of greater shock loads.

Products Used:

- Bevel Gearbox

Sea



UK's Largest Aircraft Carrier

Linear motion and mechanical power transmission systems for the advanced weapon handling system for the Royal Navy's CVF Queen Elizabeth class vessels.

The HMWHS (Highly Mechanised Weapons Handling System) uses electro-mechanical handling technology to move pallets of munitions in the magazine and weapon preparation areas of the aircraft carrier.

Products Used:

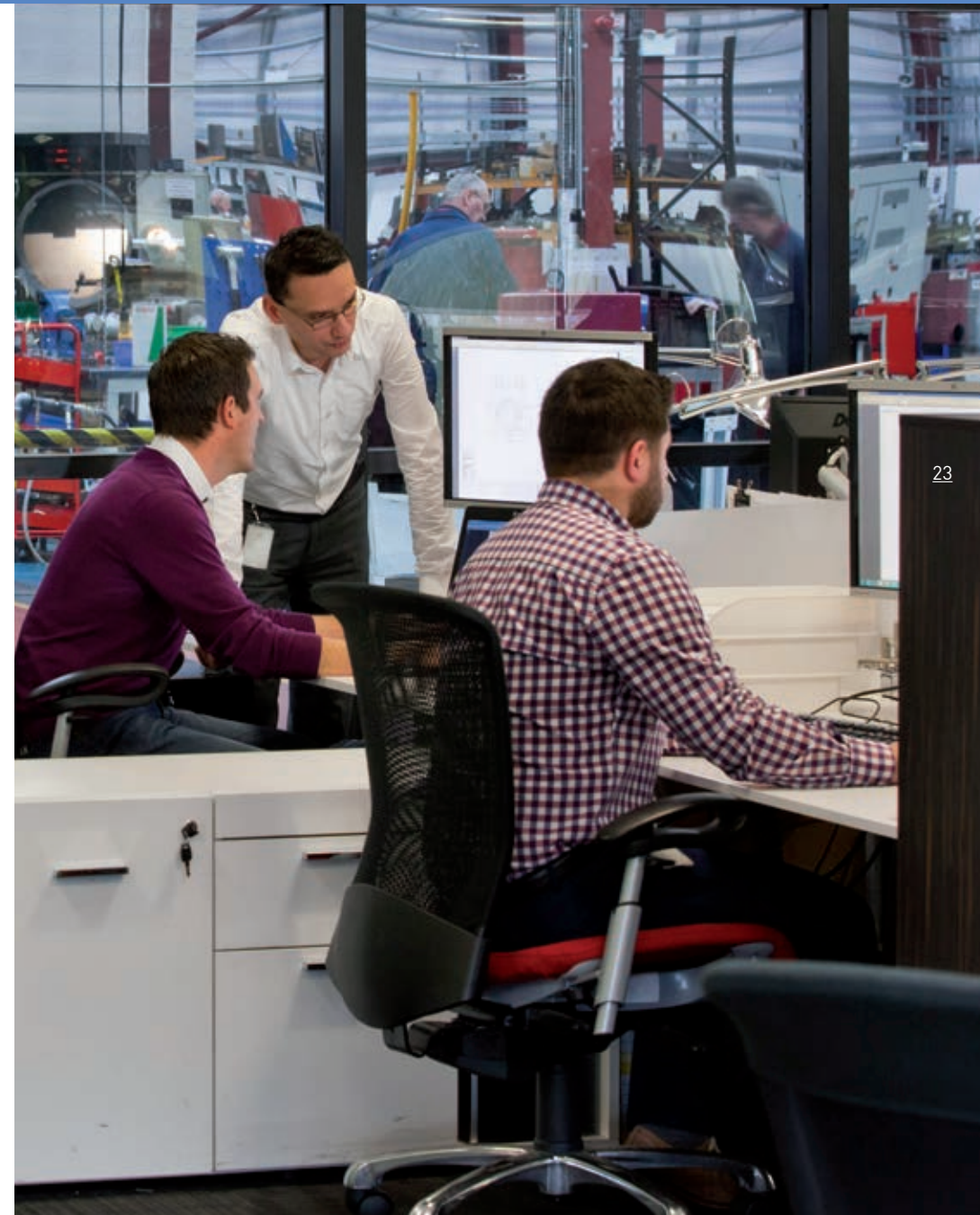
- Screw Jacks
- Bevel Gearboxes
- Electric Linear Actuators

Bespoke Design Service

When there can be no compromise on performance, quality, reliability and durability. Trust Power Jacks engineered solutions for the most demanding defence applications. Our linear motion and gearbox solutions are used in land, sea and air roles with each design engineered for specific operational applications.

Our bespoke design service allows Power Jacks to provide standard product, customised product or start from scratch. Design features can include requirements such as light weight housings, auxiliary drives, high corrosion resistance, non-magnetic material, special gear ratios, low noise products, tailored interface & mounting arrangements and submersible options. Whatever the application, our innovative and experienced team of engineers will work with you to meet the challenge.

Typical applications for our products are found on minesweepers, howitzers, tanks, armoured personnel carriers, submarines, ships, mobile & static communications, shelters, trucks, aircraft hangers, aircraft transportation vehicles and many more.



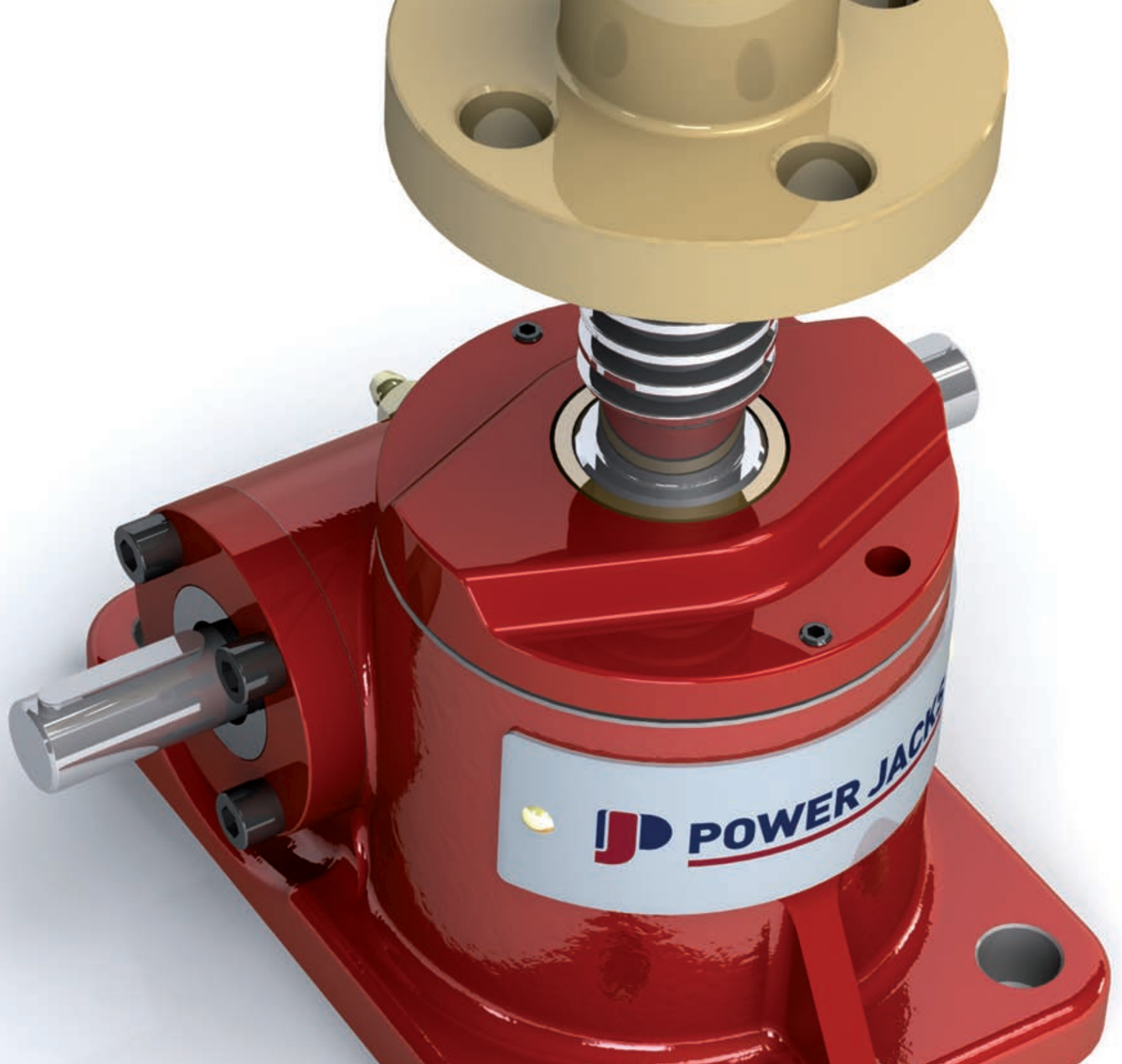
THE RANGE

Precision Screw Jacks

Spiral Bevel Gearboxes

Electric Linear Actuators

Jacking Systems



PRODUCTS - SCREW JACKS

E-Series: Metric Machine Screw Jack



Rotating



Translating



Anti-backlash



Anti-rotation

- Standard Performance Power Jack
- Metric Single Face Machine Screw Jacks
- Capacities from 5kN to 2000kN as standard
- Capacities Stainless Steel - 10kN to 1000kN as standard
- Capacities Ball Screw - 10kN to 500kN as standard
- Translating and Rotating Screw in Upright and Inverted types
- 2 Gear ratios and 1 screw lead as standard
- Anti-backlash and anti-rotation (keyed) options
- 6 mounting options including trunnion and double clevis
- Special custom designs available

E-Series: Stainless Steel Metric Machine Screw Jack



Rotating



Translating



Anti-backlash



Anti-rotation

E-Series: Metric Ball Screw Jack



Rotating



Translating



Anti-Rotation

C-Series: Metric Machine Screw Jack



Rotating



Translating



Anti-backlash



Anti-rotation

- Cubic Metric Machine Screw Jack
- Capacities from 10kN to 100kN as Standard
- Translating and Rotating Screw configurations
- 2 Gear ratios and 2 screw leads as standard
- Anti-backlash and anti-rotation (keyed) options
- 6 mounting options including trunnion

U-Series: Metric Machine Screw Jack - Subsea



Rotating



Translating



Anti-backlash



Anti-rotation

- Proven depth ratings up to 3000m subsea (deeper on request)
- Pressure compensated or flooded designs available
- Capacities up to 2000kN (200Te) as standard; up to 35000kN (3500Te) on request
- Translating & Rotating screw configurations
- Self-locking (the products only use power when moving)
- Anti-rotation mechanism for unconstrained loads
- Anti-backlash mechanism for axial positioning
- Dual nut (safety nut) fail safe load-holding option
- Full stainless steel designs available
- ROV drive interfaces

PRODUCTS - BEVEL GEARBOXES

Neeter Drive Range-N: Series 35, 37, 38, 39 and 40



2 Way



3 Way



3 Way hollow shaft



4 Way

- Ultra Compact Bevel Gearbox Design
- 2-way, 3-way & 4-way configurations
- Solid & Hollow shaft
- Gear Ratios: 1:1, 1.5:1, 2:1, 3:1 & 4:1
- Torque Ratings up to 7000 Nm
- Stainless Steel options available
- Special Custom Design Available
- Special Gear Ratios Available
- Popular models ex-stock

Neeter Drive Range-U: Series 35, 37, 38, 39, 40 and 42



2 Way



3 Way



3 Way hollow shaft



4 Way

- Subsea Bevel Gearbox Design
- Proven depth ratings up to 3000m subsea (deeper on request)
- Pressure compensated or flooded designs available
- 2-way, 3-way or 4-way shaft configurations
- Solid Shaft or Hollow shaft designs
- Gear Ratios: 1:1, 1.5:1, 2:1, 3:1, 4:1 as standard
- Special gear ratios available on request e.g. 1.25:1
- Torque Ratings up to 20000 Nm
- ROV drive interfaces

Neeter Drive Range-P: Series 2000



2 Way



3 Way



3 Way hollow shaft



4 Way

- Compact Lightweight 'monobloc' Design
- 3 & 4 Bolt Hole Mounting
- 2-way, 3-way & 4-way Configurations
- Solid Shaft & Hollow Shaft
- Gear Ratios: 1:1, 2:1 & 3:1
- Can be mounted on end flanges
- Sealed for Life, Maintenance free
- Option for manual disengage or reverse rotation of output drive shaft.

Neeter Drive Range-P: Series 4000



2 Way



3 Way

Screw jacks can be connected together in systems so that multiple units can be operated and controlled together. These jacking system arrangements or configurations can be built in many formats with the use of bevel gearboxes, motors, reduction gearboxes, drive shafts, couplings, plumber blocks and motion control devices.

Four of the most popular system configurations are the 'H', 'U', "T" and "I" configured jacking systems. Note that multiple screw jacks can be linked together mechanically or electrically. The latter is useful if there is no space for linking drive shafts.

H-Configuration



U-Configuration



T-Configuration



I-Configuration



Electric Linear Actuators



Parallel



Right Angle



Inline

- Made to Measure Electric Linear Actuators
- Dynamic Load Ratings up to 1000kN
- Linear Speeds up to 50000 mm/min
- Machine Screw Drive versions
- Ball Screw Drive versions
- Roller Screw Drive versions
- Low to high duty designs
- High accuracy designs available
- Limit Switch Options
- Incremental & Absolute Encoders
- Integrated Clutches
- 3-Phase AC, 1-Phase AC and DC Types
- Special Custom Designs Available



Lifting & Positioning Solutions

Power Power Jacks are specialist industrial engineers providing design and manufacture of quality industrial lifting and positioning equipment.

Our products are supplied globally across many sectors including Industrial Automation, Energy, Transport, Defence and Civil.

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