



JACKING SYSTEMS

Beyond Integration
Seamless Solutions™



Overview

Overview of TSC Rack and Pinion Jacking Systems

TSC designs, manufactures and sells advanced high-capacity jacking systems, including jacking units and Jacking control systems, for various Liftboat and Jack-up rigs with the jacking capacity ranging from 180kips to 1,000kips.

- TSC jacking systems offer safety, easy maintenance and a variety of outstanding features from the operation point of view.
- TSC jacking systems range from SJ220, SJ350H, SJ450, SJ750 and SJ1000 suitable for harsh-environment liftboat or jack-up rigs with water depth to 500ft. TSC jacking systems can be configured to suit any other Liftboat and jack-up rig design requirement and specific customer needs.
- TSC jacking systems can be delivered with product certificates from recognized Classification Societies such as ABS, DNV, CCS.

Operational Features

TSC rack and pinion jacking systems offer the following operational characteristics.

- Variable speed control is realized by jacking control system(only VFD control system);
- Classification Society approved offshore type electric motors and fail-safe disc brakes with realtime on/off/wear indication are applied;
- Easy automatic re-torque through PTMS and electric control system;
- Leg position indication and rack phase difference(RPD) detecting system (optional);
- Two control modes: remote integrated control and local control;
- Remote access of the control system via secured internet connection (optional);

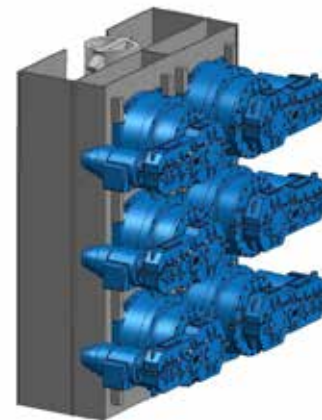
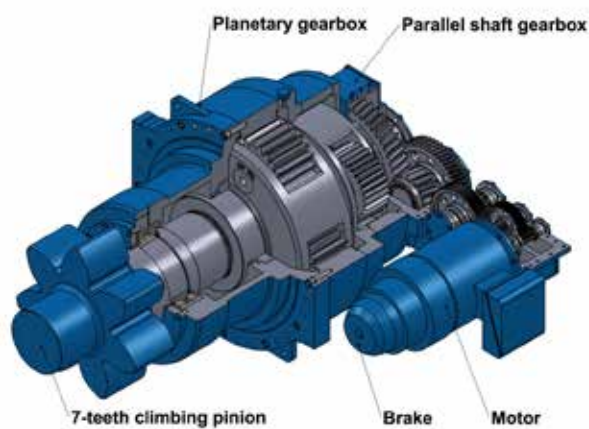
References

TSC rack and pinion jacking systems have been applied to the following jack-up rigs:

CUSTOMER	SHIP TYPE	PRODUCTS	QTY.	YEAR	STATUS
CIMC RAFFLES	Super MII	SJ450 Control System	1	2007	Delivered
CIMC RAFFLES	Super MII	SJ450 Control System	3	2008	Delivered
Calm Ocean	MCP	SJ1000 Jacking System	1	2013	Delivered
CSSC HPWS	R550D	SJ1000 Jacking System	1	2013	Delivered
GSHI	SE-200LB	SJ220 Jacking System	1	2014	In Progress
Mekers Offshore	OM 103-4	SJ350H Jacking System	1	2014	In Progress

TSC Jacking Units

The TSC jacking system includes jacking units and the jacking control system. Each jacking unit is a compound gearbox, which consists of an electric motor with a fail-safe disc brake, a parallel shaft gear reducer, a combined planetary Gearbox, a climbing pinion assembly and a pinion torque monitoring system. TSC jacking units are available for the floating and fixed type jacking structures, depending on the overall jack-up design.



- Electric Motor: a highly efficient offshore motor controlled by advanced VFD or DOL control system which could make the platform hull and leg move in a controllable and adjustable speed.
- Fail-safe Disc Brake: Classification Society approved, with the features of fail safe and real-time on/off/wear status monitoring.
- Parallel shaft Gear Reducer: well designed and manufactured with CS certificate, with the features of light-weight, high safety factor and high load capacity.
- Planetary Gearbox: reliable NGW planetary transmission structure, with the features of compact structure, high transmission efficiency, high load capacity, and good shock & vibration resistance capacity.
- Climbing Pinion Assembly: a robust pinion made from high quality alloy steel, special designed tooth profile to make the smooth engagement between the climbing pinion and the leg rack.
- Pinion Torque Monitoring System(PTMS): a torque transducer is installed at the free end of 7-teeth climbing pinion and directly measures the specific load applied by that pinion. The individual measured torque is transmitted to the jacking control system on PROFIBUS DP network. Easy automatic re-torque can be realized.

JACKING SYSTEMS

Jacking Units



Technical Specifications

	SJ450	SJ750	SJ1000
Normal jacking per pinion	440kips(200MT)	750kips(340MT)	1000kips(454MT)
Preload jacking per pinion	700kips(318MT)	1150kips(522MT)	1334kips(605MT)
Static holding per pinion		1200kips(545MT)	1600kips(726MT)
Storm holding per pinion	1000kips(454MT)	1550kips(703MT)	2000kips(908MT)
Rated jacking speed	1.5ft/min(0.45m/min)		
Design life	25Years		
Suitable for	300ft Jack-up	350ft and 400ft Jack-up	400ft and above Jack-up

Equipped on R-550D Rig (SJ1000 Jacking Unit)



Equipped on MCP (SJ1000 Jacking Unit)



TSC Jacking Control Systems

TSC supplies high reliability jacking control systems including two types: VFD control system and DOL control system. VFD control system is composed of Variable Frequency Drivers (VFD), Motor Control Centers (MCC), Leg Length Detecting System, Central Control Console (CCC), Local Control Consoles (LCC) and platform inclinometer. DOL control system is the direct-on-line control system, suit for jacking systems equipped with NEMA D motor.

Main Functions

■ **Variable Speed Control (VFD Design)**

The jacking motors of each leg are driven by variable frequency drives. This configuration allows for variable speed control between minimum speed set point and maximum.

■ **Re-Torque Control**

The Re-Torque Control can equally distribute the load among the jacking units of one leg. It is unnecessary for the operator to re-torque each motor manually with a torque wrench.

■ **Leg Length Indication**

The encoder and supporting framework are fixed to the jackcase of each leg, the length of leg below the hull will be displayed on the CCC.

■ **RPD Detecting System (Optional)**

The "Rack Phase Difference" detecting system will detect RPD by monitoring the position of each chord on a leg. The RPD data is displayed on the Central Control Center and enable the alarm before damage occurs.

■ **High Precision Inclinometer : Range: Biaxial $\pm 30^\circ$; Resolution: $\pm 0.001^\circ$; Accuracy: $< \pm 0.01^\circ$**

The setting of pre-alarm & alarm (automatically stop) is protected by password in HMI screen. An override key-operated switch is provided for emergency operation.

■ **Pinion Torque Monitoring System (Optional)**

PTMS are designed to measure the specific torque applied on each pinion and communicate to the jacking control system. All data received is displayed on the CCC. The control system automatically distributes the load applied on the jacking units and re-torque can be performed automatically.

■ **Local Control Console**

In local control mode, the LCC can be used for load transfer from rack chocks to pinions, and LCC may also fit for commissioning or repair work.

Jacking MCC:

- Safety
- High Reliability
- Fast Maintenance

Central Control Center:

- Modularity Design
- More Attractive
- More Comfortable



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