

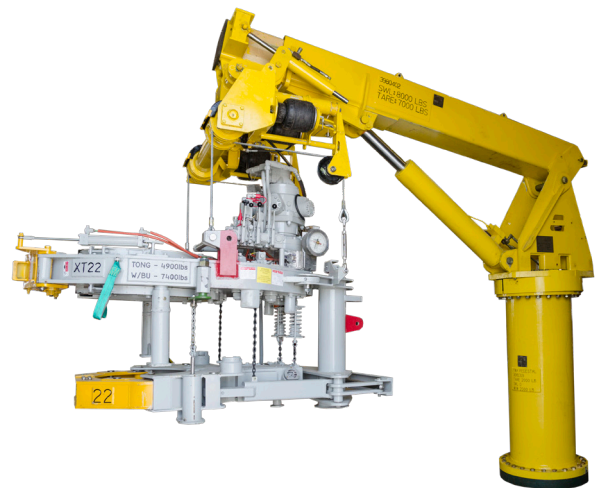
Well Construction

Frank's Tubular Running Services (TRS)

Tong Manipulator Arm System (TMA)

Tong Manipulator Arm Systems available through Frank's provide a means of suspending various size Frank's Tongs and is capable of slewing, luffing and extend/retract to move the tong to and from well center. The Tong Manipulator Arm is mounted to a floor mounted pedestal. The pedestal bolts to the base structure which is rigidly attached to a suitable structure on the rig floor. The following Frank's Casing Tongs can be used with the Tong Manipulator Arm System: 7 5/8 in. Tong, 14 in. HT Casing Tong, 14 3/8 in. Tong, and XT-22 Casing Tong

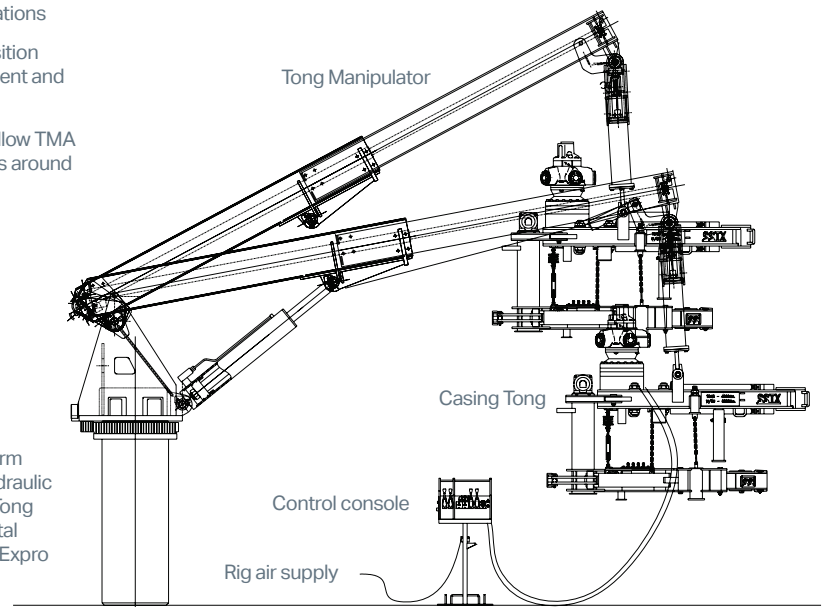
The tong is manipulated to and from well center by the boom extend/retract functions, the vertical position is adjusted via the boom luff up/down functions. The Tong Manipulator arm can also be rotated by the slew function and is typically used to access well center and secondary positions such as an auxiliary rotary or mousehole. The Frank's Tong Operator is provided control of all Tong Manipulator Functions as well as the tong and backup functions at a single Frank's Tong Control Console that can be located at any convenient location on the rig floor.



Features and Benefits

- Single Stand Alone Remote Control Console facilitates function of TMA system and Tong and can be integrated with Fluid Grip Control functionality for Remote Control Fluid Grip Operations
- 10 ton capacity allows Tong Operator to lift tong into position on drill floor without use of tugger to allow for more efficient and safer rig up of tong system
- TMA system is equipped with pad eye configuration to allow TMA to be used to support rig up and lifting of other TRS items around well-center

The Tong Manipulator Arm System will require a hydraulic source supplied to the Tong Manipulator Arm Pedestal and rig air supply to the Expro Control Console.





Well Construction

Frank's Tubular Running Services (TRS)

Tong Manipulator Arm System

Specifications	7 5/8 in. Casing Tong	14 in. HT Casing Tong	14 3/8 in. Casing Tong	XT 22 Casing Tong
Max Torque (High Gear)	5,600 ft-lb @ 3,000 psi	8,000 ft-lb @ 3,000 psi	11,000 ft-lb @ 3,000 psi	18,000 ft-lb @ 3,000 psi
Max Torque (Low Gear)	30,000 ft-lb @ 3,000 psi	44,000 ft-lb @ 3,000 psi	70,000 ft-lb @ 3,300 psi	100,000 ft-lb @ 3,000 psi
Max Speed (High Gear)	60 RPM's	65 RPM's	34.6 RPM's	19.2 RPM's
Max Speed (Low Gear)	11.3 RPM's	9 RPM's	8.2 RPM's	2.1 RPM's
Max Hyd. Pressure	3,000 psi	3,000 psi	3,300 psi	3,000 psi
Max Hydraulic Flow Rate	75 GPM	84 GPM 80	GPM	75 GPM
Pipe Size Range	7 3/4 in. to 2 7/8 in. OD	13 3/4 in. to 4 1/2 in. OD	14 3/8 in. to 5 1/2 in. OD	13 1/4 in. to 22 in.