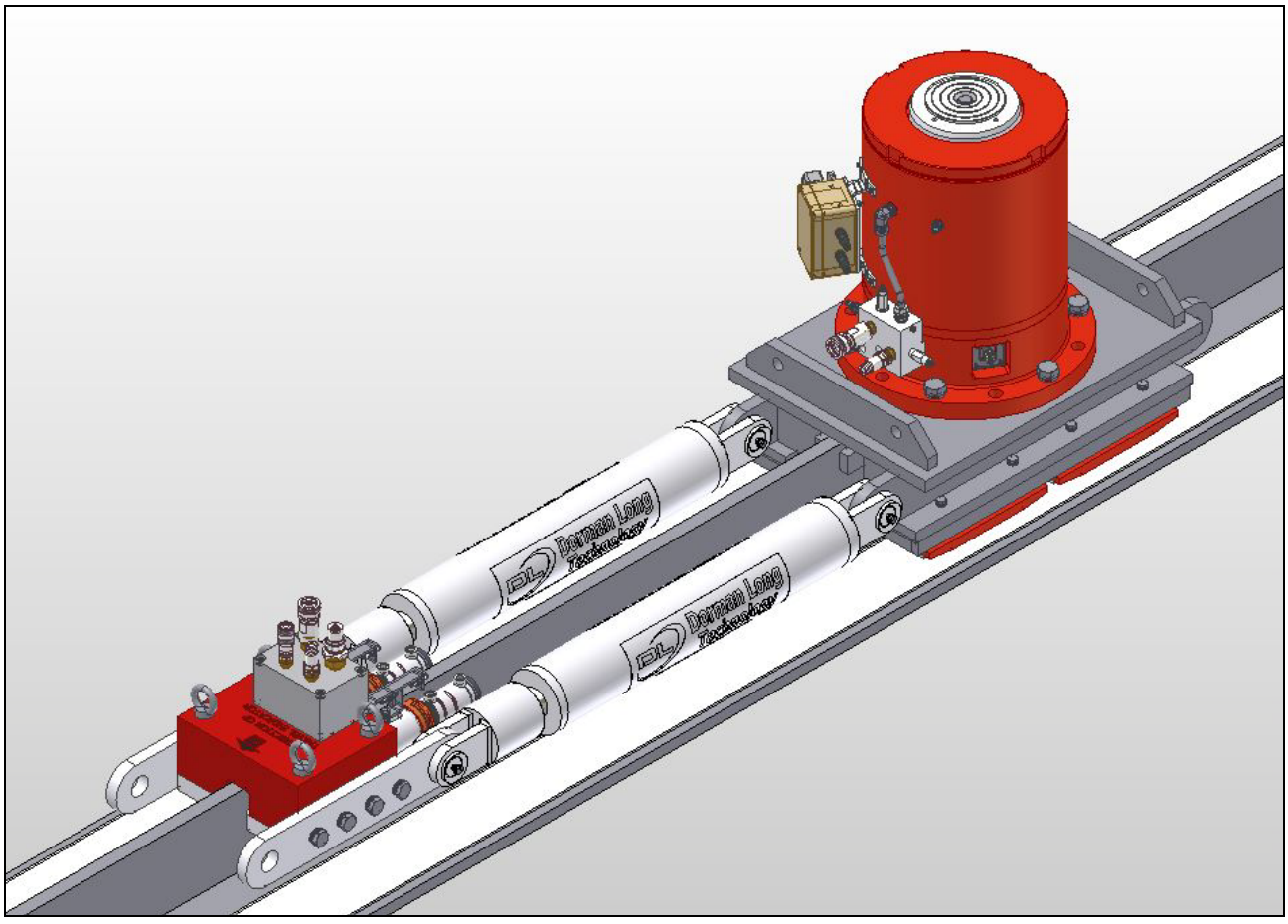
Dorman Long Technology

DL-SU synchronous jacking and skidding systems



Introduction

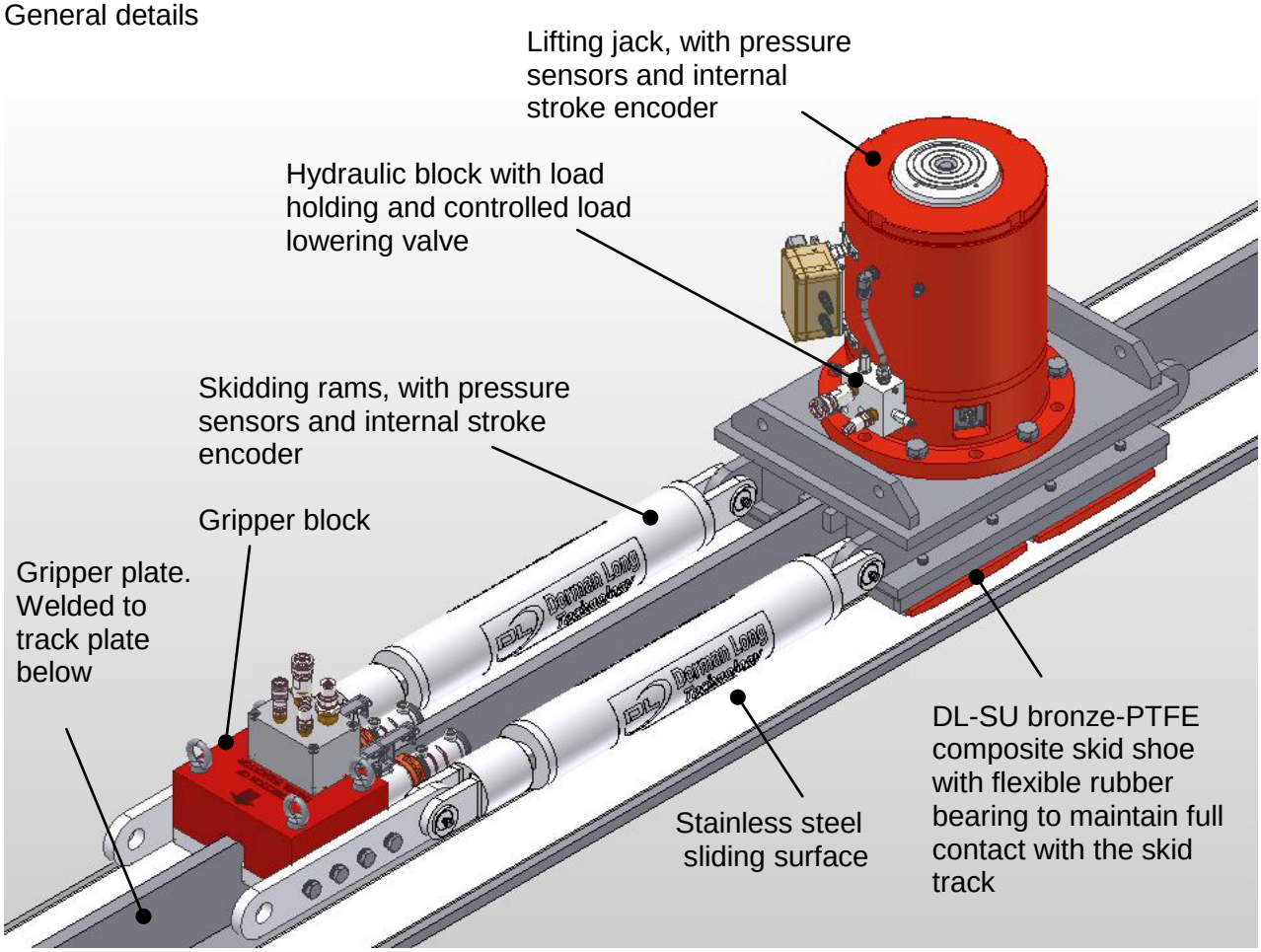
DL-SU synchronous jacking and skidding systems use the latest technology in hydraulic jacking systems and sliding materials to provide a compact, modular, durable and highly controllable method for moving heavy loads.

32 No DL-SU skid units on 8 bridge piers skidding a 4920 tonne 254m long bridge in the UK

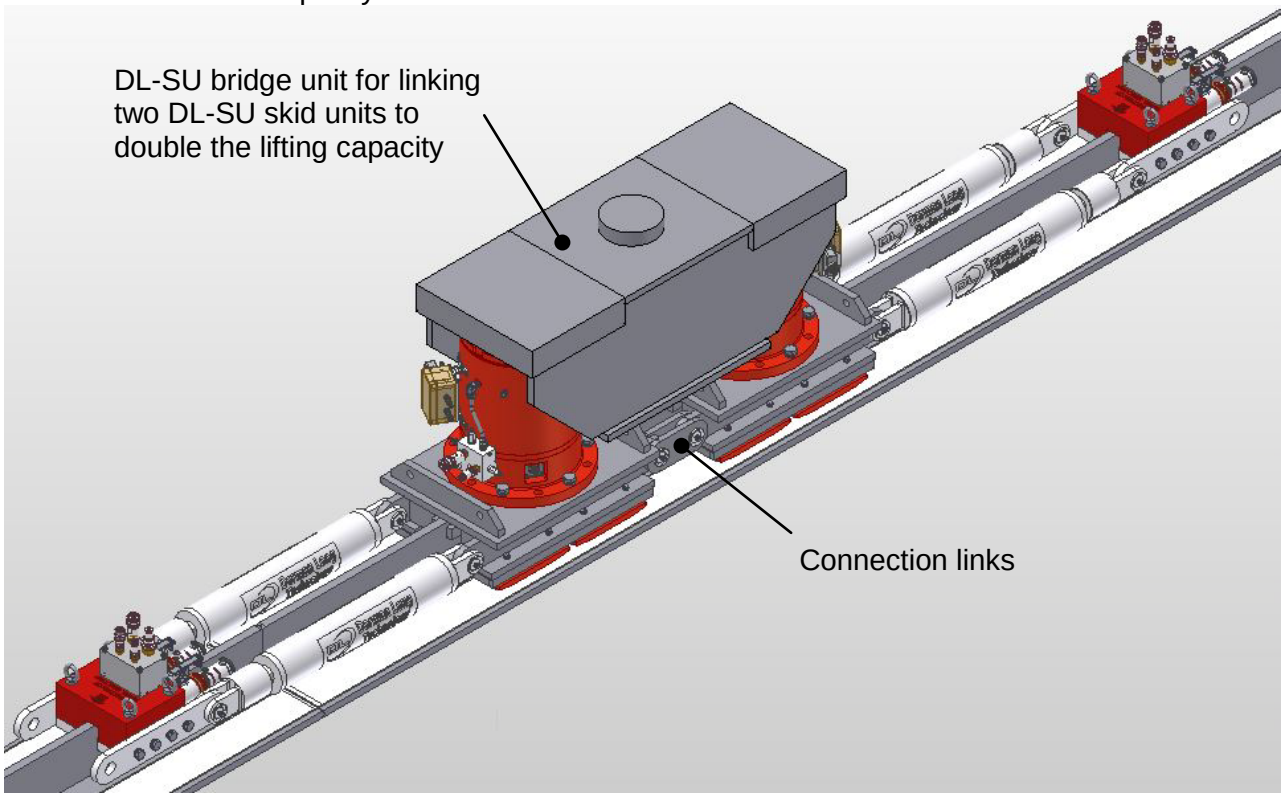
The main features of the DL-SU synchronous jacking and skidding systems are as follows:

- DL-SU skid units available in 3 sizes, 200 tonnes, 333 tonnes and 666 tonnes capacity.
- DL-SU skid units can be connected in pairs for 400 tonnes, 666 tonnes and 1332 tonne capacity jacking points.
- 150 mm vertical jacking stroke as standard, other strokes available on request
- DL-SU skid units make use of the same power packs and computer control system supplied for our strand jack and climbing jack systems, for maximum return on investment.
- The robust and durable sliding interface used is Bronze-PTFE metal bearing shoes on the underside of the DL-SU skid units in contact with stainless steel running plates on the skid track. DL-SU bearing shoes have life of 800-1200 m of skidding, dependent on loading
- Gripper jacks are used for horizontal skidding, giving complete freedom in the positioning of the DL-SU skid units along the track.
- A simple T section skid track is used that can be fabricated by the client (to our specification)
- Our proven DL-P40 computer control system is used for accurate stroke synchronisation and load monitoring of up to 120 DL-SU units from a single rugged and weatherproof control computer. This control system has many features including automatic compensation for skid track settlement or deflection, overload protection and data logging of all operations
- Automatic compensation for skid track settlement and deflection
- Each jack is fitted with a load holding valve and load lowering valve to securely hold the load in the event of a hose burst and to provide accurate and smooth synchronisation during load lowering.
- Piston pumps are used in the power packs to give long life and good natural synchronisation
- Jacks, rams and hoses are pressure tested and certified to 150% working pressure. Power packs are pressure tested and certified to 125% working pressure.

DL-SU skid units
General details

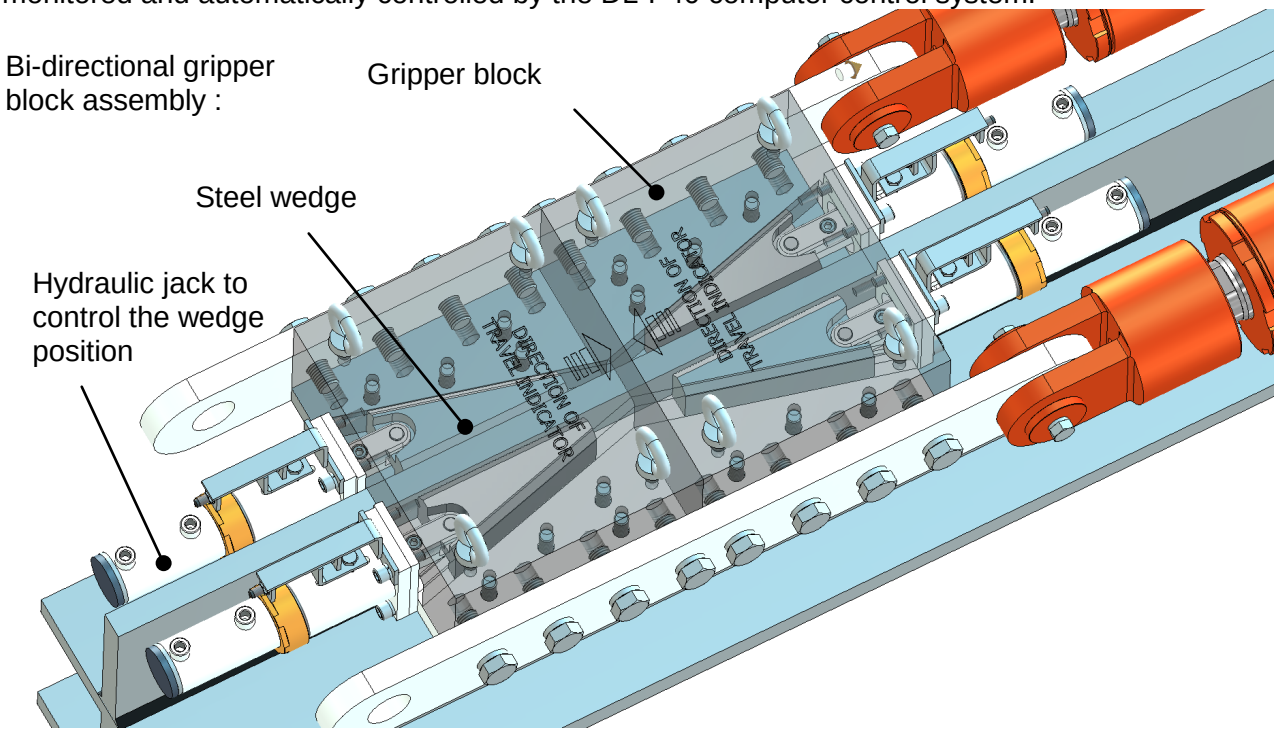


Twin unit for double capacity



Gripper block details

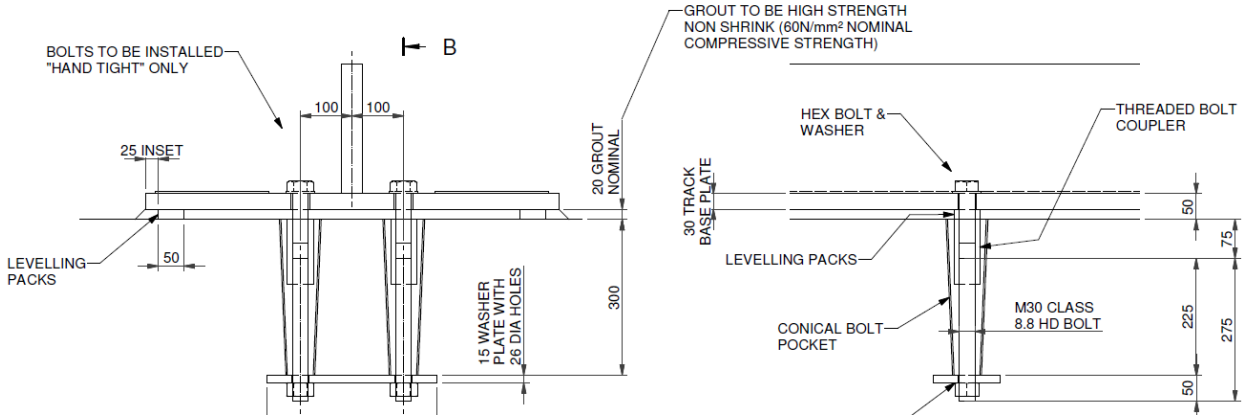
Gripper blocks work use a pair of steel wedges to grip the upstand gripper plate. They work in one direction and the direction of travel can be easily reversed by turning the block around. Alternatively, a second gripper block can be added as shown below. The gripper blocks are monitored and automatically controlled by the DL-P40 computer control system.



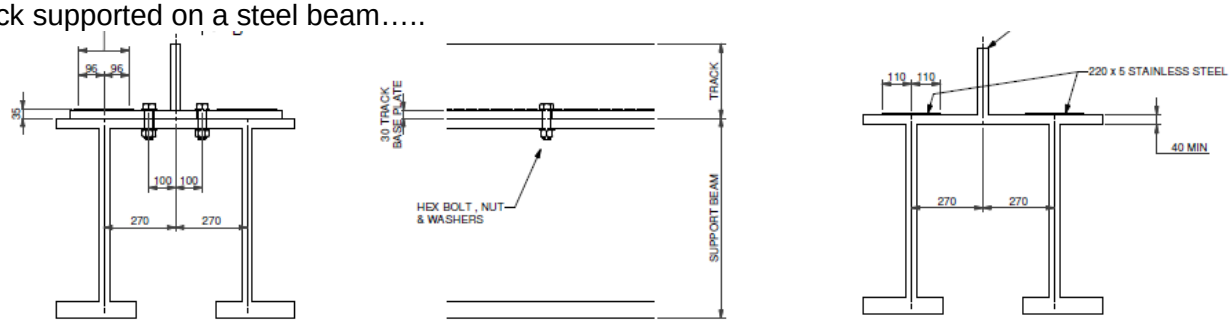
Skid track typical details

The DL-SU track is a simple T shape fabrication, with 5 mm stainless steel running plates. This track shape can be formed on the top of a steel beam or supported on a concrete beam with a high strength grout interface as shown below. (DL-S666 track details shown).

Track supported on a concrete beam….:



Track supported on a steel beam…..



Power packs :

The DL-SU skid units make use of the same standard power packs that we use for our strand jack and climbing jack systems. Our hydraulic power packs are designed for reliability, long life in harsh site environments and for ease of handling and transport. Power packs can be ordered to operate up to 12 DL-SU skid units from a single power pack. The notable features of our power packs are as follows:

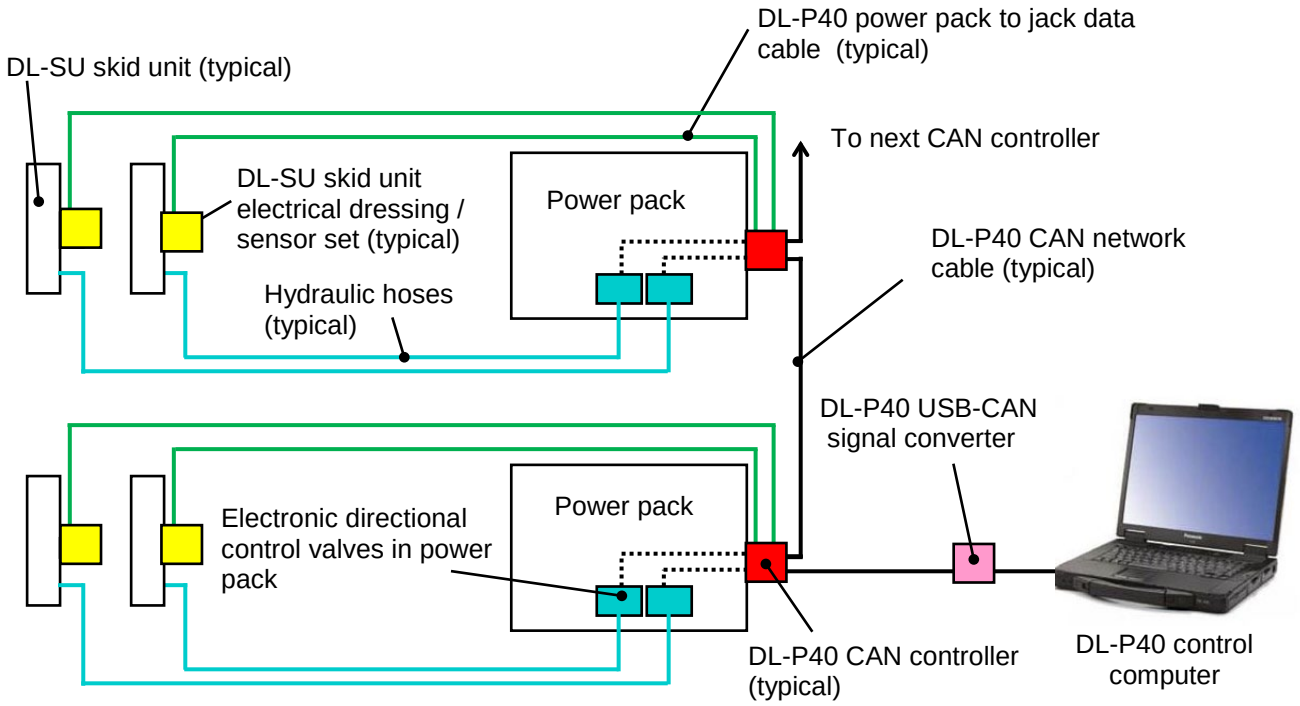
- Motors sized to work at 80% power with full flow and maximum working pressure.
- Pressure tested and certified to 125% of maximum working pressure
- Designed for transport in standard shipping containers
- Each main outlet has a separate motor, pump and valve train. In the unlikely event of a component failure in this circuit only a single main outlet will be affected.
- Off line oil filtration and oil cooling circuit included. A separate high flow and low pressure cooling and filtration circuit is used to give efficient a long lasting cooling and cleaning of the oil. This allows continuous working at full load in temperatures up to 45 deg C whilst maintaining the hydraulic oil temperature at below 70 degrees to prolong the life of the seals in the hoses, valves and jacks.
- Tank heaters fitted to warn the oil in cold temperatures prior to starting the pump. Running cold oil (under 20 deg C) through the pump and directional control valves can cause damage and/or premature wear.
- External crash frame included, to protect all the components during transport and handling on site. The crash frame is fitted with doors on all faces and the QRC couplings are mounted in a recess for added protection. The crash frame is supplied with forklift handling points at the bottom and lifting lugs on the top. (see photos below for example)
- Fixed control panel and control system cabinet included, and housed within the crash frame for protection during transport. The control system cabinet is prewired for connection to external DL-M and DL-P40 control systems.
- Large oil tank for effective cooling and particle settlement.
- Electronic remote start/stop of the motors using DL-P40 computer control system
- Oil temperature, level and pressure readings available locally at the power pack and also remotely at the DL-P40 computer control screen.
- Corrosion protected for long life in all environments

Typical DLT electrically driven power pack for operating 2 No DL-SU skid units :

Control system

The DL-SU skid units make use of the same DL-P40 computer control system that we use for our strand jacks, climbing jacks and all other synchronous jacking systems. The DL-P40 computer control system is capable of operating up to 120 DL-SU skid units from a single control computer and uses the latest CANbus communication technology for fast and reliable operation. The hardware and software are both fully tested and certified to European standards for Electro-magnetic interference. This control system has been developed entirely in-house in close cooperation with our own operators and we are confident that it is the safest and most user friendly system on the market

The schematic layout of the DL-P40 system hardware is as follows :



The main features of the DL-P40 computer control system are as follows:

- Clear and simple display of all the sensor data – see example control screen on the next page
- Automatic stroke synchronisation of the vertical lifting jacks and the horizontal skidding jacks.
- Automatic open/close of the gripper block wedges
- Automatic correction for track settlement or track beam deflection.
- Automatic overload warnings, plus many other safety features
- Automatic log file of all jack loads, jack strokes, settings and user commands
- Remote start/stop of the power packs
- Remote sensing of power pack oil temperature and level in the tank, with automatic warnings.
- Modular system that can be expanded and easily customised to operate all types of hydraulic jacking systems.
- Simulation mode for training and demonstration purposes, which can be set up by the user to run any combination of jacks and power packs.
- Simple and accurate method for calibrating all the stroke sensors
- All setting data such as expected loads and jack plan co-ordinates can be saved in a project file and loaded into the system to avoid the need to type in the data again after shutting the system down at the end of a shift.
- Many safety features including fault detection, overload protection and high oil temperature warnings

DL-P40 Typical operating screen, showing 20 No DL-SU skid units:

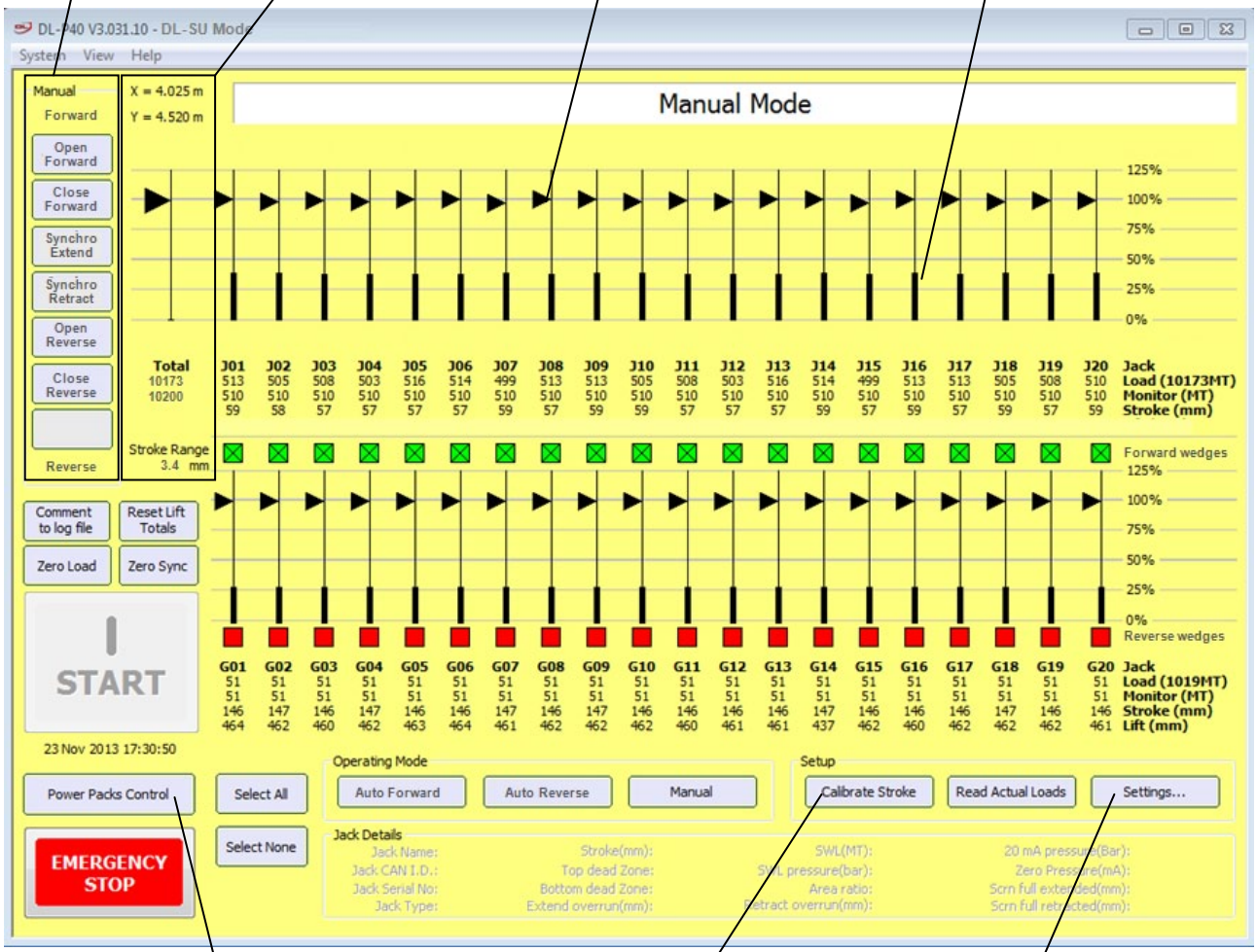
Additional DL-SU skid units can be shown on further screens connected to the control computer. The top row shows the load and stroke in the vertical jacks supporting the loaf, the bottom row shows the load, stroke and forward/reverse gripper wedge open/closed state in the skidding jacks. Gripper wedge status is shown as green for closed, red for open and X for loaded.

Manual operating buttons

Plan co-ordinates of the centre of gravity , the total load on the system and the stroke range (max-min stroke)

Load in each jack shown graphically as % of expected load, with actual values listed below

Stroke of each jack shown graphically as % full stroke, with actual values listed below



Click for power pack control screen :

- Turn power packs on and off
- Control variable speed (when fitted)
- Monitor oil temperature & level
- Monitor oil pressure
- Monitor power usage

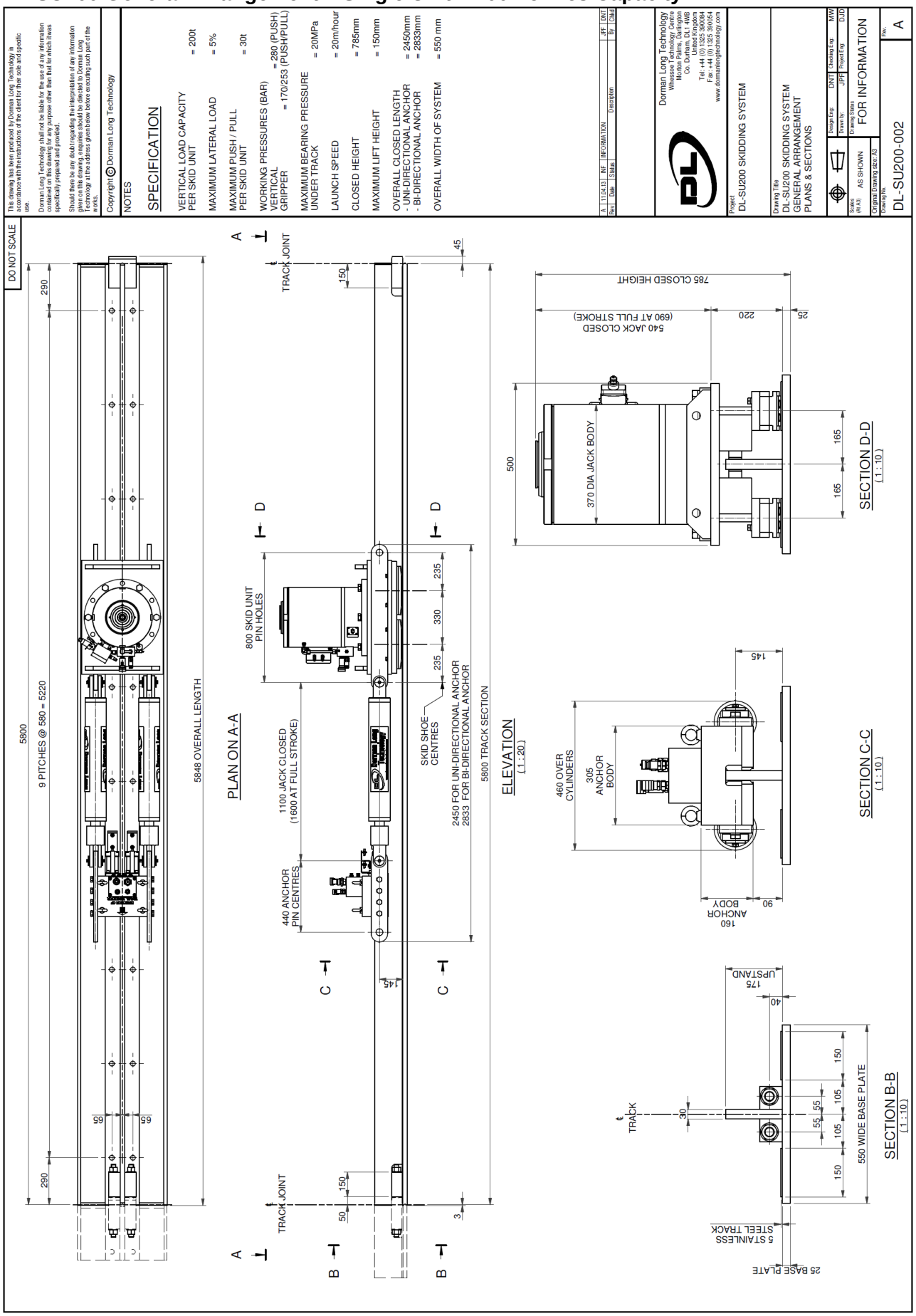
Automatic stroke calibration

Click for settings screen :

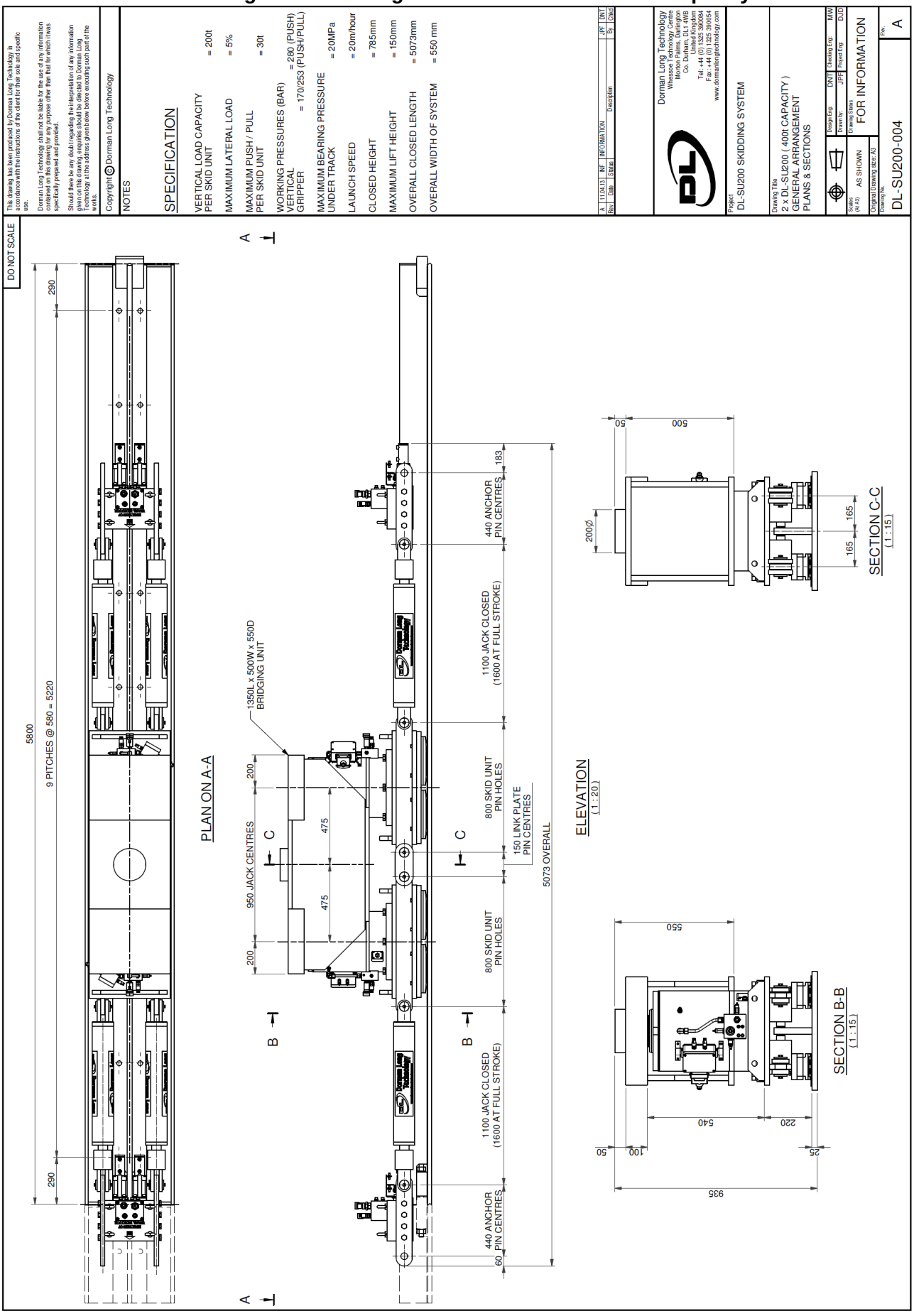
- Jack name and position on screen
- Expected load for each jack
- Plan co-ordinates of each jack
- Allowable synchronous stroke range
- Max allowable load for each jack
- Many other settings

The operator can select any combination of jacks to operate and presses the Sychro Extend and Sychro Retract buttons to lift and lower the load. The system will automatically synchronise all the jack stokes to maintain the required level of stroke synchronisation. A log file of all jack loads, user commands and warnings is automatically saved for every operation and the operator can comment to the log file at any time using the 'comment to log file' button.

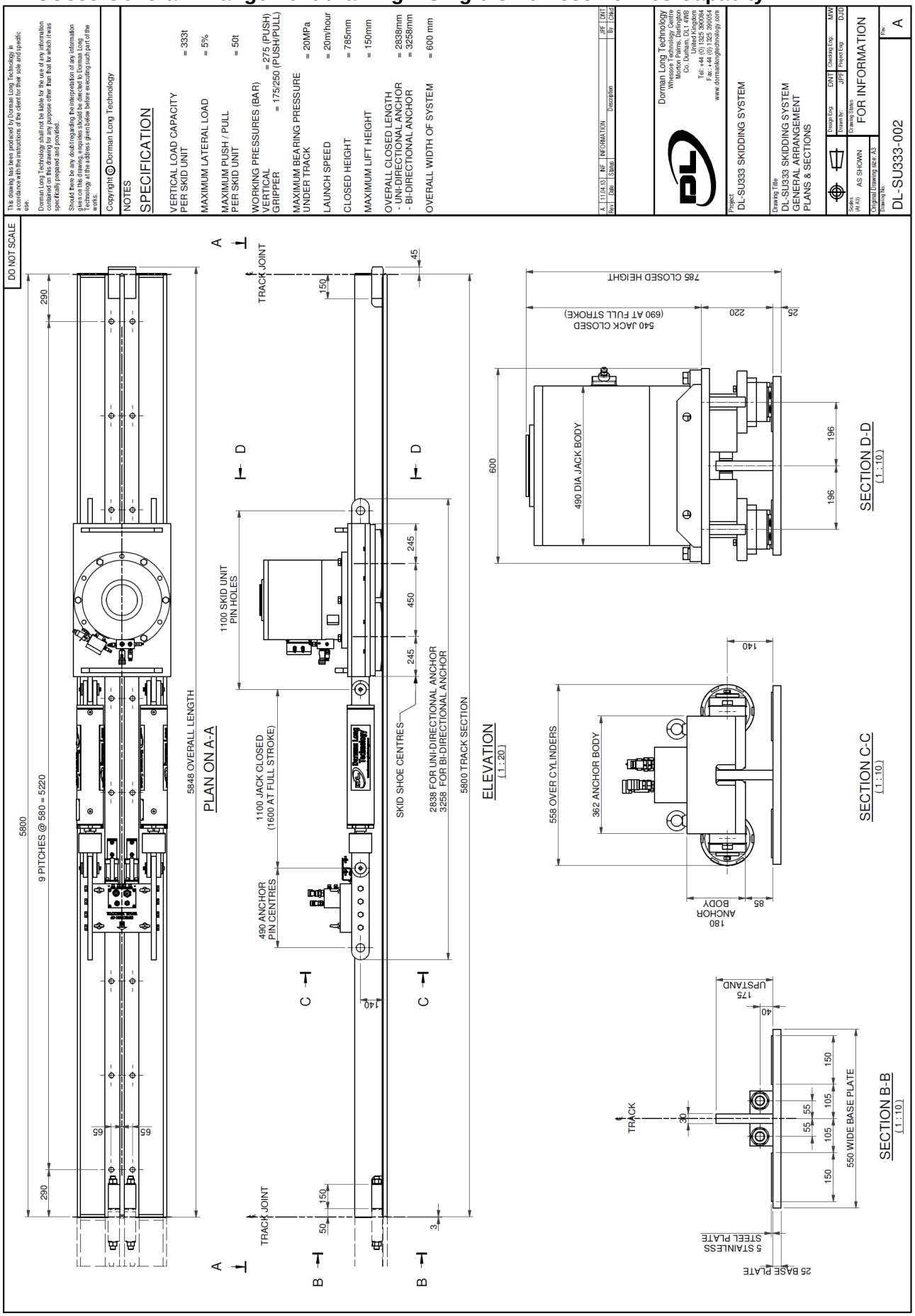
DL-SU200 General Arrangement – Single Unit – 200 Tonnes Capacity



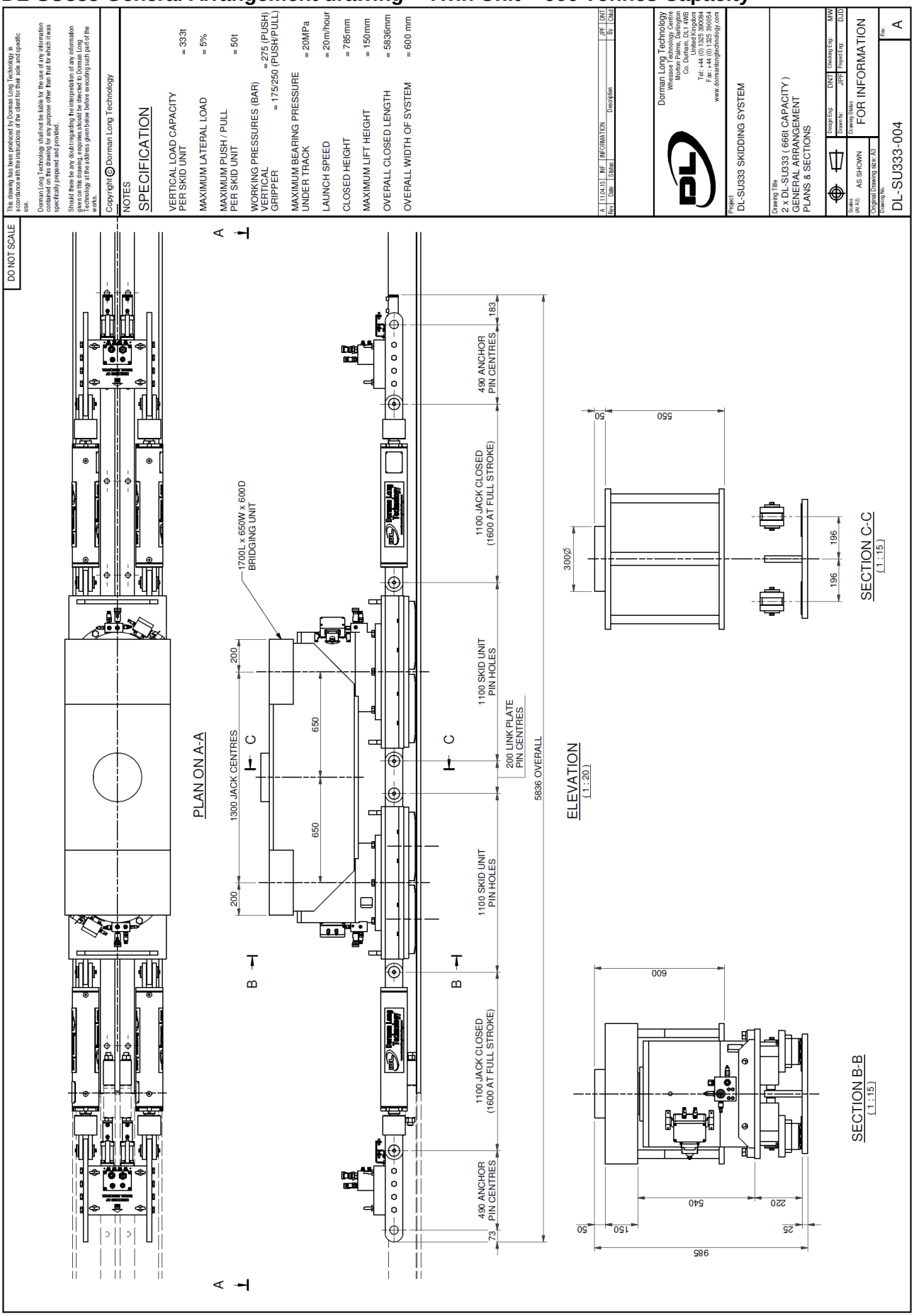
DL-SU200 General Arrangement drawing – Twin Unit – 400 Tonnes Capacity



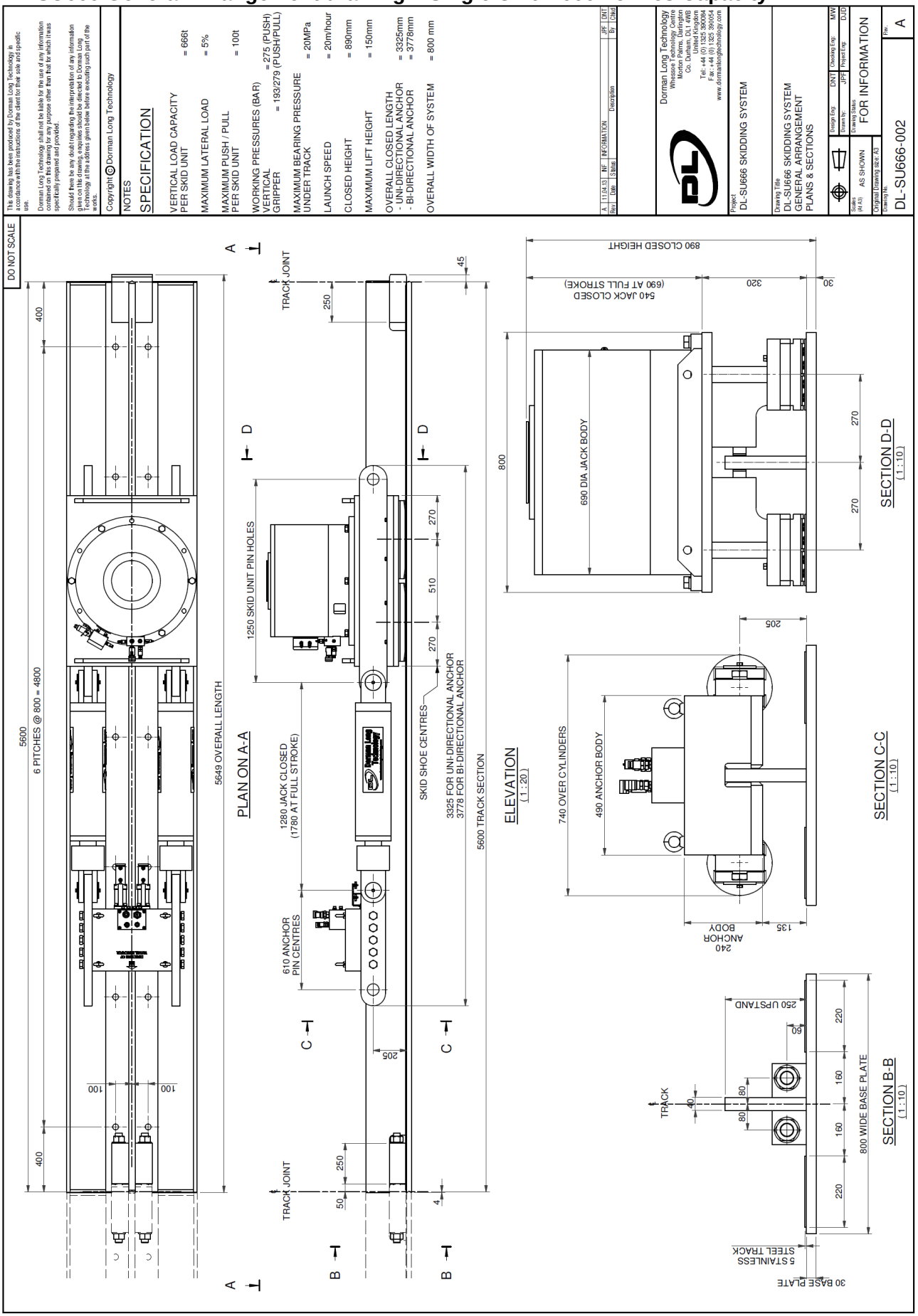
DL-SU333 General Arrangement drawing – Single Unit – 333 Tonnes Capacity



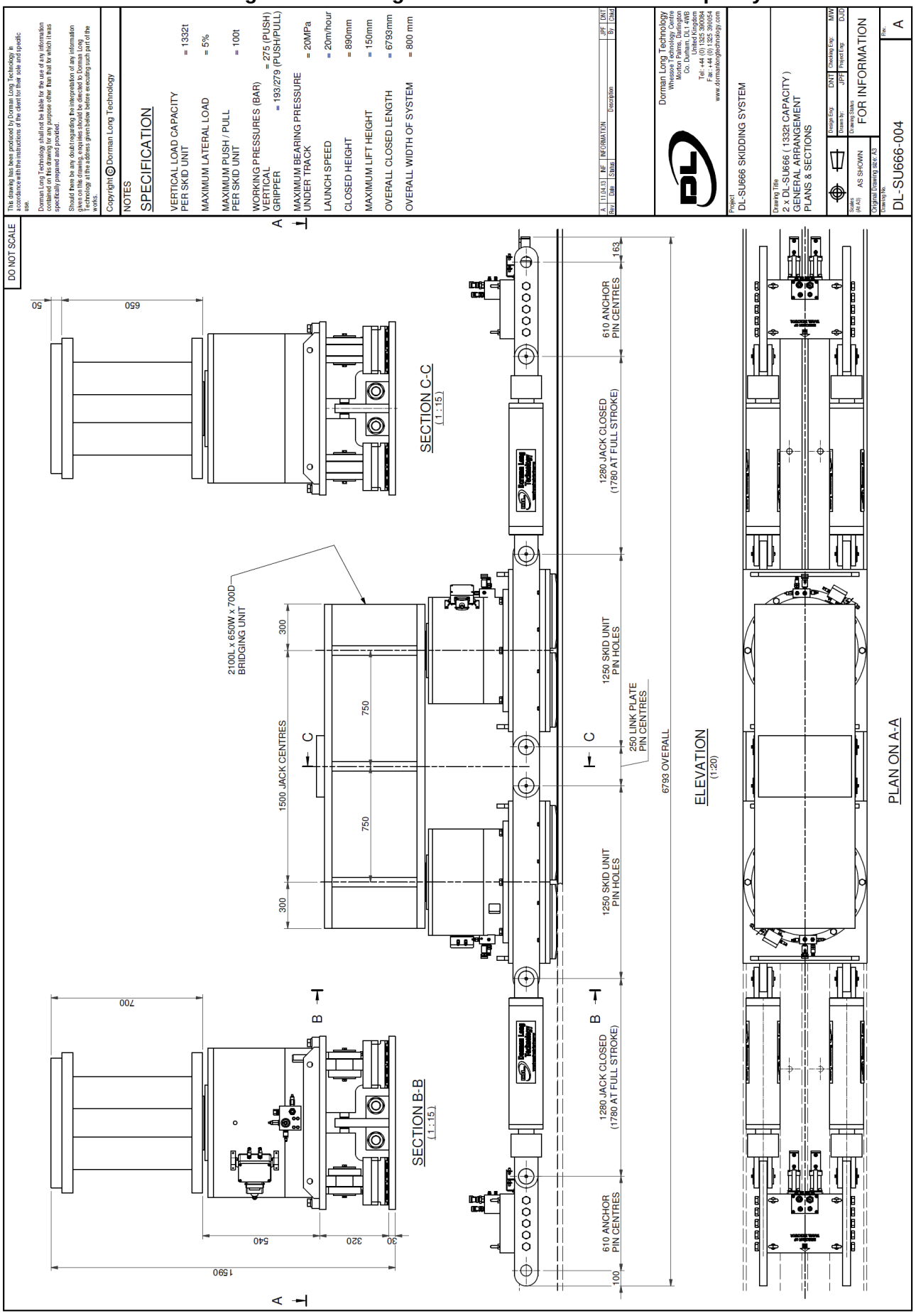
DL-SU333 General Arrangement drawing – Twin Unit – 666 Tonnes Capacity



DL-SU666 General Arrangement drawing – Single Unit – 666 Tonnes Capacity



DL-SU666 General Arrangement drawing – Twin Unit – 1332 Tonnes Capacity



Contacts

UK Head Office:
The Charles Parker Building, Midland Road
Higham Ferrers, Northamptonshire, NN10 8DN, United Kingdom
Tel. +44 (0)1933 319133, Fax. +44 (0)1933 319135
Contact: Mr David Dyer. david.dyer@dormanlong.com

UK Northern Office:
Whessoe Technology Centre
Morton Palms, Darlington
Co Durham, DL1 4WB, United Kingdom
Tel. +44 (0)1325 390010, Fax. +44 (0)1325 390054
Contact: Mr Chris Wilkinson. chris.wilkinson@dormanlong.com

China Office:
Dorman Long Technology (Shanghai) Co. Ltd
19D, Ju Jia Building, 1336 Huashan Road
Changning District, Shanghai 200052
Tel. +86 (0) 21 62110500, Fax: +86 (0) 21 62110523
Contact: Mr Hongyi Tao. hongyi.tao@dormanlong.com

India Office:
Dorman Long Technology India Pvt. Ltd.
Upper Ground Floor - 26, C Block
Omaxe Gurgaon Mall, Sohna Road,
Gurgaon
Pin-122018, Haryana, India.
Tel. +91 124 4270791

Contact: Mr Amanpreet Singh Lamba. aman.lamba@dormanlong.com