

Multifunctional self-reacting bed for railway sleepers and bridge beams

The Northern Ireland based precast manufacturer Moore Concrete Products Ltd. offers a quality precast concrete service to the civils, building and agricultural market sectors throughout the UK and Ireland. To invest in the further development of the company's operations, they required a prestressing line which needed to be multifunctional. At first, the bed was going to be used for manufacturing railway sleepers, afterwards, the line needed to be suitable for making bridge beams. Construx bvba supplied a multifunctional self-reacting bed to accommodate moulds for sleepers, bridge beams or almost any other type of prestressed element.

Moore Concrete insisted in getting a flexible and affordable solution for the prestressing line. They did not want to invest too much in foundation works because the prestressing line might need to be extended or moved to another facility in the future. To meet this requirement, Construx designed the prestressing line as a self-reacting bed. This means that the bed takes all the prestressing forces and no abutments are required. The bed is conceived as a modular setup with a live-end and a dead-end, both 4.5 m long and both with a 6 m long bed part connected to the end structure. In between

both ends, the bed is assembled with three 12 m long modular bed parts. This gives a 57 m overall length, including live-end and dead-end, with a 48 m usable bed length, which is easily extendable. All bed parts as well as the live-end and the dead-end are held onto the factory floor by means of sliding foot plates, so the entire bed can slightly move back and forth. The foot plates of the bed parts are fixed by means of mechanical anchors, the foot plates of both live-end and dead-end are fixed onto the factory floor with grouting anchors. So, the modularity consists in having a live-end with a 6 m bed, a dead-end with a 6 m bed and several 12 m long (or shorter) bed parts fitted in between.

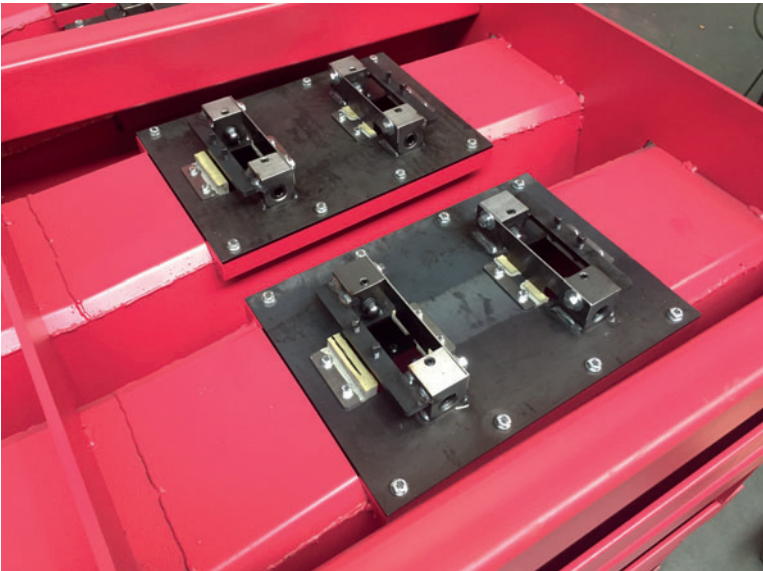
This setup allows Moore Concrete to be extremely versatile and flexible for future projects. With the actual setup, the bed is suitable to manufacture two prestressed girders of up to 24 m in length. The self-reacting bed has a 1,500 t prestressing capacity allowing for a maximum moment of 435 tm. The live-end is equipped with three series of two single-action hydraulic rams: two 650 t rams at the base, two 100 t rams in the middle and two 100 t rams at the top. One hydraulic group with controls operates all rams. The position of middle and top rams can be adjusted in height in order to accommodate



Overview of the self-reacting bed



Long line setup with 6-gang sleeper moulds



Interchangeable rail seats with Pandrol shoulder fixation

prestressing strands at different heights and to allow for a maximum prestressing height of 2,250 mm and a maximum prestressing width of 1,996 mm. At all three heights, the live-end and the dead-end are equipped with very thick and solid steel radiator strand divider blocks.

The multifunctional self-reacting bed is suitable to accommodate 4-, 5- or 6-gang railway sleeper moulds (16 at the actual 48 m net length) and the full range of bridge beam moulds, MY, MYE, Y, YE, T, TY, TYE, M, UM, and W up to W19. The bed itself is a 2,664 mm wide open structure on which moulds and bases of different heights and widths can be fixed. The outside formwork is placed onto the bed and fixed sideways against its base. Systems for fixing and securing of the bases



Stressing the strands



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Pouring SCC in the sleeper moulds



Demoulding and turning device

and the outside forms onto the bed are included. A repetitive pattern of double holes along all transverse profiles (every 1,000 mm) combined with a multifunctional connection on both sides along the main longitudinal profiles (every 1,000 mm), allows for the fixation of different types of moulds. The bed has incorporated heating pipes underneath which are connected to a hot water boiler.

Another great advantage of this type of self-reacting bed is the speed of installation. From scratch, it didn't even take one week for the Construx technicians to have the bed completely installed and commissioned. And up to two weeks before commissioning, the customer can use the same facility for

other purposes. When choosing the abutment type prestressing lines, the installation may easily take more than a couple of months for civil works. Works to be carried out at both ends (deep excavations and large and heavily reinforced foundations) and in between the abutments (heavy-duty reinforced floor). The future is with the multifunctional self-reacting beds: quick, flexible, versatile and above all value for money. It is a very economical way of producing prestressed concrete elements.

The first prestressed elements to be manufactured on the bed were railway sleepers for Translink - Northern Ireland Railways. The construction job was awarded to Mott MacDonald who



Series of prestressed railway sleepers with Pandrol fastening system



Test setup at Translink

placed the order with Moore Concrete. Receiving the order early January to have the first sleepers manufactured by mid-March was quite a challenge for both Moore Concrete and Construx. Starting from scratch, as having no sleepers produced before, Moore Concrete relied on the Construx expertise in conceiving the moulds as well as the rail seat fixation system and an easy and quick demoulding system.

The aim was to produce 96 sleepers per day in 16n° 6-gang moulds. Construx designed the moulds with interchangeable rail seats, allowing Moore Concrete to use the same moulds with a different rail fastening type, if required in the future. The initial rail fastening system was a Pandrol type. The Pandrol shoulders were held into position by means of springs and rubber sealants. Construx installed a retraction system on the sides of the self-reacting bed to make sure the moulds get back into their initial position after releasing the strands. In order to achieve the required daily production, Construx also supplied a 6-gang single-action demoulding and 180° turning device.

As proven above, the future is with the Construx multifunctional self-reacting beds: no more long-term civil works, no more huge irreversible investments. Construx is an engineering-driven manufacturing company relying on the commitment, creativity and experience of its employees. Their aim is to establish a partnership, rather than to be a supplier, in providing turnkey solutions for precast and on-site formwork issues. ■

FURTHER INFORMATION



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