The fabrication, assembly, and installation of the K-2 fractionating column of the AT-6 unit for primary petroleum distillation cause considerable difficulties because of the large dimensions and weight (diameter, 7000 mm; height, 44,920 mm; and weight including internal components, 303 tons) of the column.

The shells of the column are made of double-layer steel with a total thickness of 22 mm. The column has 38 fractionating plates.

Since the column dimensions exceed the permissible limits for railroad freight shipments, it was shipped to the construction site in the form of individual prefabricated parts: the body in the form of rolled parts of stacked shells and the internal components in dismantled form. The fabrication of the column was completed at one of the construction sites by an installation team.

Preliminary technical and economic calculations carried out by designers of the State Institute for the Design of Special Installations (Giprospetsmontazh), as well as the grid diagram for column assembly and installation operations, showed that the most difficult operation and the one which prolongs significantly the column installation time as a whole is the assembly of the column, mainly the welding of the body, under construction-site conditions.

The cylindrical part of the column consists of 24 shells. The shells were assembled according to a layout pattern on a special stand designed by the State Institute for the Design of Special Installations ensuring correct diatomic dimensions and strict verticality of each shell.

Every two shells adjacent on the layout pattern were assembled into vertically positioned shell units by means of special tightening devices and spacers, after which tack welding was performed. Then the next two joints were welded on by hand. Connecting pipes, branch pipes, and bosses were mounted simultaneously.

After the quality of the welded joint of the plating layer was checked, the two shell units adjacent on the layout pattern were assembled vertically into a block unit. The block unit was fitted out with internal components, which increased its structural rigidity, after which it was sent to a roller stand for automatic welding of the outer layers. The floors were assembled convexity up, together with the two adjacent shell units.

For a number of reasons (complexity of fabrication, untransportability, the need for reinforced-concrete bases, etc.), it is not expedient to use the welding stands of chemical-machinery construction plants at the construction site. Therefore, the State Institute for the Design of Special Installations designed, and the All-Union Order-of-Lenin Trust No. 7 fabricated, a new roller stand (Fig. 1) for the automatic welding of cylinders 2-8 m in diameter and up to 300 tons in weight.

The stand consists of driving and idle roller supports and a gantry for operating the automatic welding unit and guide paths.

Fig. 1. Welding stand with column unit to be welded and the gantry.
The driving roller support (Fig. 2) consists of two supporting-roller units, metal support structures, two drives (one for each supporting-roller unit), and a supporting frame. Each supporting-roller unit has three rollers 750 mm in diameter rigidly attached to a single shaft which rotates in supporting slip bearings. The drive has an independent supporting frame, which is bolted to the frame of the roller support. The roller support, which is also bolted, can be moved together with the drive, making it possible to weld columns of various diameters.

The height of the roller supports, equal to 1175 mm, ensures rotation of the column with manholes and connecting pipes mounted. The permissible load for one roller support is 52 tons. Each drive consists of a type A-51-4 electric motor with a power of 54.5 kW at 1440 rpm, two RM-500 and RM-350 speed reducers with a gear ratio of 48.57, and a V-belt drive with a gear ratio of 4. The use of the two drives in the design ensures reliable operation of the stand, even when the structure being welded is significantly out of balance. At a cylinder weight up to 100 tons, the stand can operate on one drive. The operation of the drives is synchronized by a common control panel and by slippage of the driving belts.

The rate of rotation of the column is changed by the combined replacement of the driving and driven pulleys of the V-belt drive; the length of the belts remains constant, and they are tightened by moving the electric motor.

The gantry is made of pipes 108 × 6 mm in diameter, and on the crossbar there is a working platform for operating the automatic welding unit. Welding operations can be performed from the gantry along the entire length of the column.

Both the circumferential and the longitudinal joints were welded automatically. Of a total length of welded joints of the cylindrical part of the column body (including the supporting shell) equal to 900 m, 770 m were welded automatically, i.e., more than 85%. Inspection of the welded joints confirmed their good quality.

The use of the stand made it possible to reduce the welding time for the K-2 column by about half. The stand is simple to operate, and it weighs significantly less than the stationary stands of the machinery construction plants.

The column was installed in consolidated units, including internal components, design maintenance platforms, and temporary platforms for welding the installation joints. The lower installation units were mounted in design position with two track cranes, and the upper ones were mounted with tackle masts. The most economical method for hoisting the column is a method of rotating it around a hinge (Fig. 3). Existing tackles make it possible to install by this method completely assembled columns weighing up to 600 tons.

For hoisting the column by rotating it around a hinge, the All-Union Trust for Petroleum-Plant Installations (Neftezavodmontazh) designed and fabricated a special hinge device with a lift capacity of 400 tons. The supporting shell of the column was divided into two parts: the lower part was mounted on a base, carefully checked, and fastened with anchor bolts; the upper part was left on the column itself and jointed to the