The 350 continuous jobbing mill consists of ten horizontal and four vertical stands in three trains (Fig. 1). The facility is planned for transfer of strip between rolling lines by chain transfers. The relevant technical data for the transfers are:

<table>
<thead>
<tr>
<th>Transfer No. 1</th>
<th>Transfer No. 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of chains</td>
<td>18</td>
</tr>
<tr>
<td>Spacing between chains, mm</td>
<td>3000</td>
</tr>
<tr>
<td>Number of ducking dogs on chain</td>
<td>2</td>
</tr>
<tr>
<td>Speed of advance, m/sec</td>
<td>1.41</td>
</tr>
<tr>
<td>Driving motor rating, kW</td>
<td>60</td>
</tr>
<tr>
<td>Spacing between ducking dogs, mm</td>
<td>8800</td>
</tr>
</tbody>
</table>

The horizontal stands can be moved, in unison with the pinion stands, on the mill shoes perpendicular to the rolling direction, as required to maintain a constant rolling line in switching from one pass to another.

The mill is used to roll: rounds 25 to 65 mm diameter, die-rolled sections shapes No. 25-40 for valves, strip steel 28.5 x 165 mm in section and angles No. 4.5-7.5. Mill stand X is the finishing stand for rounds 56-68 mm in diameter, and the third continuous rolling train handles the other shapes. The "oval - upright oval" series is used for rolling rounds in the rundown stands. Upright oval passes are bored into the rolls of stands VIII and X. Strip rolled in these stands adjusts automatically in feeding into the next stand because of the difference in horizontal and vertical dimensions. This eliminates the need for tilting devices ahead of stands IX and XI, since constant re-

![Diagram of rolling mill equipment layout](image-url)

Fig. 1. Rolling mill equipment layout: I to XIV) rolling stands; K) tilting device; 1) continuous billet-heating furnaces; 2) dividing shears; 3) catcher; 4) flaps; 5) loop coupling; 6) top of roller table.
duction of strip is assured in the required direction. Free-spread-
ing open forming passes with flanges opening gradually outward
are used as preleade passes for rolling angle shapes. The shape
of the cross section of strip rolled in stands VIII and IX is shown
in Fig. 2, and the dimensions of the cross sections are entered
in Table 1.

Chain transfer No. 2 failed to operate reliably in the ini-
tial period of the mill's operating history; chains broke off fre-
cquently, and the roll stock emerging from stand X got caught in
the chain dogs, so that the strip became bored and damaged.
This took place primarily when long-length strip was rolled at a
high speed after stand X.

Following out a suggestion put forth by mill stand workers, VNIMETMASh Metallurgical Machinery Research
Institute developed drawings for repeater No. 2 (Fig. 1) for transferring work from stand X to stand XI, while workers
in the bar section department developed drawings of repeater No. 1 for feeding workpieces from the first rolling train
to the second.

These repeaters are welded single-trough breakout type repeaters designed for operation without looping, since
the rolling speeds of adjacent stands are synchronized while the repeaters are operating by means of separately driven
working stands energized by electric power drives. There are two radii to the looping channel belonging to repeater
No. 1, one radius to that of repeater No. 2. The troughs are of rectangular cross section and 300 mm deep. The re-
peaters are stationary, with the loop part of the trough (indicator, in diagram), placed at the entrance to the repeater
to accommodate strip arriving via the chain transfer.

Introduction of these repeaters for production rolling of rounds 25 to 50 mm in diameter did not require any
changes in the design of incoming and outgoing fittings, or in roll pass design. Transfer of strip is automated and
the system operates reliably.

Rolling of equal-angle irons No. 4.5-5 with automatic feed and feed or rolled work through two repeaters, and
angle irons No. 6.3-7.5 with feed of rolled work through repeater No. 2 from the second rolling train to the third is
now routine practice.

Several design modifications were introduced to facilitate repeating of angle sections. Flaps were welded onto
the outer wall of the repeater trough in repeater No. 2 at the entrance to the loop (Fig. 1). A catcher was installed
at the exit from the loop leading onto the roller table; the catcher grips the leading end of the rolled piece and di-
 rects it into the loop coupling. This coupling is a slotted trough acted upon by the repulsive force which can be po-
sitioned at any angle in its shell. The roller table ahead of stand XI is covered by a trough-shaped lid which keeps
the leading end of the rolled work from turning over on one side and keeps rolled strip from moving off the roller
table. The welded lid is cooled by water. Only a catcher directing the leading end of the rolled products into the
entry guide box of stand IX was installed at the exit of repeater No. 1 in front of stand IX.

When angle sections are being rolled (passing through repeater No. 1), section-shaped strip is bent counter-
clockwise relative to the vertical axis of the section by the repulsive force of the rollers as it enters the repeater
trough and makes the entire turn in that position (Fig. 3b). The leading end straightens out later on when it runs up
against the left-hand sideguard of the catcher, and thus passes through the catcher.

<table>
<thead>
<tr>
<th>TABLE 1. Repeated Rolled Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of repeater</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
<tr>
<td>1</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>2</td>
</tr>
<tr>
<td></td>
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</tbody>
</table>