

Parkegate has it all wrapped up

When rolling strip on an aluminium cold breakdown mill, in order to facilitate the initial wrapping of the strip head end around the coiler mandrel, two typical methods are employed, a 'gripper' slot or a beltwrapper.



Originally supplied Beltwrapper head for over-coiling (1999).



New Beltwrapper head for over and under-coiling (2014).



New Beltwrapper head in operation (2014).

Of the two methods, the gripper slot is particularly suited to thick, hard alloy strip and comprises a hydraulically operated slot in the coiler mandrel itself. The nose is guided into the slot and then gripped, which then allows the mandrel to rotate and tightly wrap the strip around it. Design of the slot geometry needs to pay particular attention to creating a smooth transition around the circumference, avoiding any steps in the coil build up which could lead to tension fluctuations and poor coil quality.

When spools are employed on thinner strip, the gripper slot can no longer be employed and a beltwrapper is then required. Named after the continuous belt that is used to guide and wrap the strip, the beltwrapper can be used over a wider range of thicknesses than the 'gripper' slot and can often eliminate the need for the 'gripper' slot, making the design of the mandrel somewhat simpler and less expensive.

The beltwrapper guides and bends the strip nose around the mandrel, or spool, with the geometry carefully considered to ensure that a tight wrap is achieved. The belts are typically of a woven fabric, the type of which is selected to suit the operating conditions (belt tension and strip temperature). There may be one or two belts employed depending on various factors including strip width.

Each beltwrapper head is specifically designed to suit the mandrel and spool diameters of a particular mill. Although there are some common sizes in use across the industry, there are still a significant variety of bespoke sizes in use. The beltwrapper head incorporates a pivoting nose arm that creates the necessarily large belt engagement length required to successfully contain and wrap the strip nose. As the diameters of the mandrel and spool are inescapably different, the nose arm must accommodate both sizes, and this is achieved by means of two back-to-back hydraulic cylinders, one long stroke to perform the main pivoting movement which takes it to the spool position, and a second with a short stroke that takes the nose in further to the mandrel position. The opposing arm is

normally fixed and is designed to act as a strip guide during the threading process.

Most mills are designed to either over-coil or under-coil, and this is typically determined by considering the different benefits of each mode, which include:

Over-coiling:

- keeps the top strip surface on top throughout the rolling process (with over-uncoiling on the entry side), thereby reducing the number of contact points and potential for surface marking/scratching.
- any surface 'debris' or oil carryover on the strip is less likely to be wrapped into the coil.

Under-coiling:

- enables both the top and bottom strip surfaces to be observed together at the coiler, enabling a general observation of surface quality to be performed.
- raises the relative coil position and can reduce the need for pits, and potentially enables the coil handling to take place at floor level without resorting to an elevated passline mill.

There are occasions where a producer has the requirement to combine the two operating modes, as was the case on a recent Parkegate project. The existing mill configuration utilised an exit tucking / passline roll to impart a wrap angle on the exit shape roll to generate the required resultant force to give a reliable flatness measurement signal.

In expanding their product range, a particular new product interacted with the tucking / passline roll in such a way as to induce a false reading on the shape roll, leading to the flatness control system trying to compensate for an error that wasn't there, thereby adversely affecting the resultant strip flatness. To overcome this, the coiling of the new product was changed to under-coiling, which eliminated the need for the tucking / passline roll. As the original products still required to be over-coiled, it created the need to provide both over and under-coiling on the mill.

New head design

As this could not be accomplished with the existing beltwrapper head, which Parkegate had supplied back in 1999, Parkegate were employed to design and supply a new beltwrapper head. By arranging for the new head to operate within the existing rails and in conjunction with the existing threading table, it was possible to minimise the cost, amount of installation work and downtime required.

The design of the new head incorporates pivoting top and bottom nose arms. Depending upon the mode of coiling, one of the nose arms is pivoted into position whilst the other is held fixed, directing the strip nose over or under the mandrel / spool as required. Both pivoting movements have two stages to cater for the wrapping of the strip on to a spool as well as directly on to the mandrel.

Parkegate was responsible for the design and supply of the new beltwrapper head as well as for the supervision of its installation. As part of its manufacture, the head was fully assembled and shop tested to help smooth the installation and commissioning process. It was put into successful operation earlier this year, quickly returning the mill to full production, with the beltwrapper's new functionality facilitating the rolling of the new product line.

The project was one of a number of mill upgrades undertaken by Parkegate for this client over the last few years, and they include a new coiler unit complete with mandrel and a strip drying system, all of which has maintained their mill performance at a competitive level.

Beltwrappers are only one facet of Parkegate's wide-ranging modernisation and upgrade portfolio. From the performing of an initial study, to the design and supply of equipment right through to its installation and commissioning, Parkegate can offer clients a full range of upgrade services

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