

Common Hot Rolled Shapes

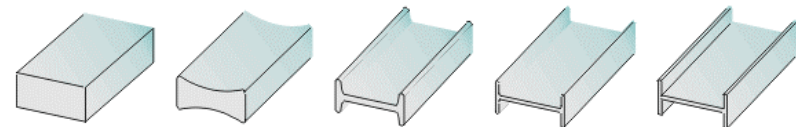
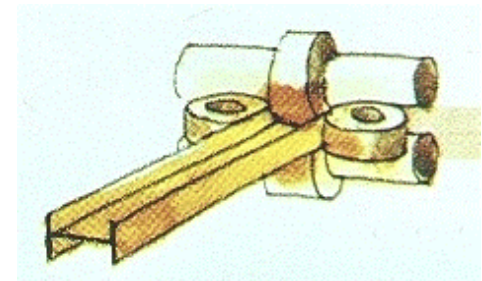
HSC 6-11, 6-19

Summary

- hot blooms, billets or slabs of steel by passing through a series of grooved rolls
- rolling tolerances
- increase of shape mass by spreading rolls:
 - for W Shapes the thickness of both flange and web is increased, the distance between inside faces of flanges being unchanged
 - for S Shapes and Channels the web thickness and flange width are increased by equal amounts, the distance between outside the flanges being unchanged
 - for angles the thickness of each leg is increased an equal amount
- tolerances (permissible variations in the mass, cross-sectional area, length, depth, flange width, camber, sweep and other geometric properties) exist
- official designation for structural steel is the metric (SI) designation
- available shapes:
 - WWF shapes
 - W shapes
 - HP, S and M shapes
 - C and MC shapes
 - angles (L)
 - hollow structural sections (HSS)
- Canadian and North American sections may also be defined using imperial designations
- Handbook of Steel Construction provides only Canadian metric designations
- shapes identified with an asterisk (*) in these tables are not produced by Canadian mills

General

Rolled structural shapes are produced by passing hot blooms, billets or slabs of steel through a series of grooved rolls. Wear on the rolls can cause the dimensions of the finished product to vary slightly from the theoretical, published dimensions. Standard rolling tolerances have been established to make allowance for roll wear, and other factors. These tolerances are contained in CAN/CSA G40.20-M for shapes supplied according to CSA material standards, and in ASTM Standard A6 for shapes supplied according to ASTM material standards. In Canada, the official designation for structural steel sections for purposes of design, detailing and ordering material, is the metric (SI) designation. For WWF, W, SLB and HP shapes, angles, cold formed channels, and hollow structural sections, this is described in the CAN/CSA-G312.3-M92 Standard. Canadian and North American sections may also be defined using imperial designations. However, all tables of properties and dimensions, and all design tables included elsewhere in the Handbook of Steel Construction provide only Canadian metric designations, metric properties and metric design information. Tables on pages 6-21 to 6-28 list Canadian (SI) Designations and corresponding Imperial Designations. Shapes identified with an asterisk (*) in these tables are not produced by Canadian mills.



Rolling of W-Shape from Solid by Passing through Sets of Rollers of different Cross Sections

Methods of increasing area and mass by spreading rolls

Most nominal size groups of rolled shapes contain several specific shapes, each of which is slightly different in mass, area and properties from other shapes in the same size group. Methods used to increase the area and mass, from the minimum nominal size, by spreading the rolls are described below:

For W Shapes (Fig. 1), the thickness of both flange and web is increased, resulting in an increase to the overall beam depth and flange width, with the distance between inside faces of flanges being unchanged.

For S Shapes and Channels (Fig. 2 and 3), the web thickness and flange width are increased by equal amounts, all other dimensions remaining unchanged.

For angles (Fig. 4) the thickness of each leg is increased an equal amount, resulting in a corresponding increase in leg length.

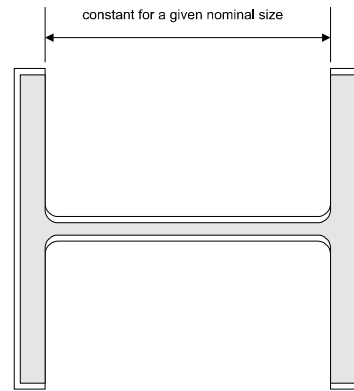


Fig. 1

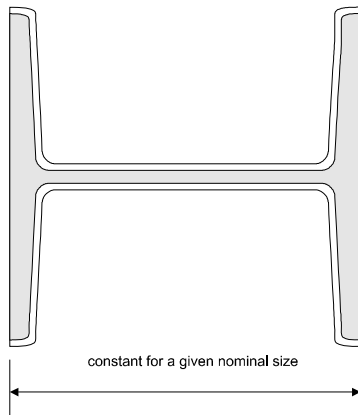


Fig. 2

Tolerances

Tolerances are the permissible variations in the mass, cross-sectional area, length, depth, flange width, camber, sweep and other geometric properties of a rolled or welded section.

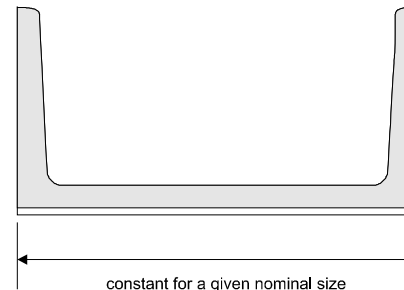


Fig. 3

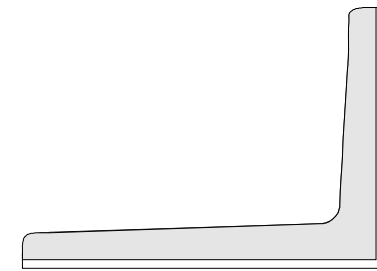


Fig. 4

Camber and Sweep

After a section is rolled, it is cold straightened to meet the specified sweep and camber tolerances.

Camber is a deflection, approximating a simple regular curve, measured along the depth of a section. It is usually measured half way between two specified points. The length for purposes of determining the “maximum permissible variation” is the distance between the two specified points.

Sweep is a deflection, similar to camber, measured along the width of the section.

Shapes

- WWF Shapes
- W Shapes
- HP Shapes, S Shapes, M shapes
- C Shapes, MC Shapes
- Angles (L)
- Hollow Structural Sections (HSS)

Gimme Five

Which one of the following shapes consists of welded rolled plates:

HP, S and M shapes	<input type="checkbox"/>
W shapes	<input type="checkbox"/>
WWF shapes	<input type="checkbox"/>

Indicate which of the following designations may define a shape in Canada:

metric (SI)	<input type="checkbox"/>
empirical	<input type="checkbox"/>
imperial	<input type="checkbox"/>

Which are the main tools involved in the production of hot rolled shapes :

hammer and nails	<input type="checkbox"/>
grooved rolls	<input type="checkbox"/>
drop-forges	<input type="checkbox"/>

By which measures can a shape mass be increased:

spreading the rolls	<input type="checkbox"/>
decreasing the rolling temperature	<input type="checkbox"/>
changing the steel composition	<input type="checkbox"/>

Camber is a deflection, which is measured along the ...

width of a section.	<input type="checkbox"/>
depth of a section.	<input type="checkbox"/>
thickness of the web.	<input type="checkbox"/>