STRUCTURAL STEELS

Trough Bridges with Thick Deck Plates

DILLINGER

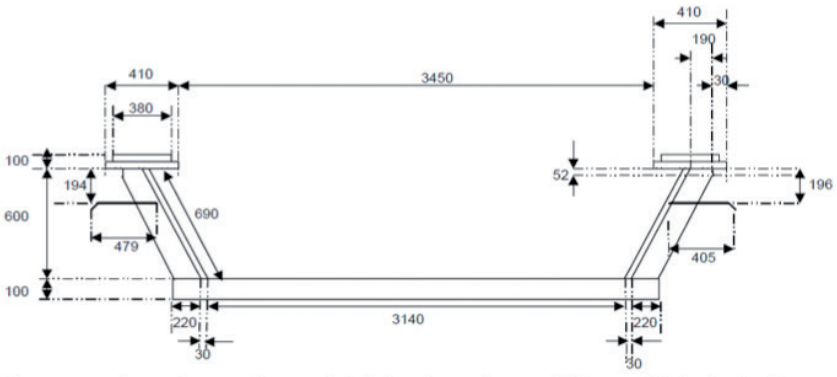
ENGINEERING ADVANTAGES + COST-EFFICIENCY

Investment in the future

Europe's rail infrastructure is showing its age. Bridge refurbishment projects - and new bridges - are needed urgently at many locations. The politicians have recognized this and set up programmes of investment in many countries. These will, in the main, concern short-span bridges, such as rail overbridges, for example.
Not only the "classical" criteria, such as construction costs and project completion time, but also, and increasingly, other important factors, such as the sustainability and durability of these bridge structures, are now being taken into account in investment decisions more and more frequently. In most cases, construction must be implemented on the existing system, i.e., "in traffic", for which reason the rapidity with which bridges can be completed is now playing an ever more important role. Trough bridges featuring thick deck plates have proven to be the ideal bridge design for short-span overbridges.

Slender structures

The special benefit of this type of trough bridge is the fact that the deck plate consists of a single thick steel plate (or if necessary several thick plates joint together in direction of train) with the advantage that it is possible to dispense with crossbeams underneath the track plate. Web plates are in many cases welded on to stiffen the trough walls.

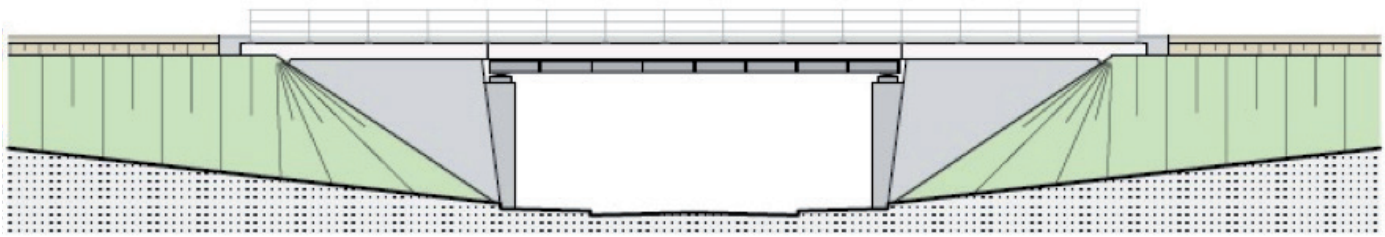


Cross-section of a steel trough bridge featuring a 100 mm thick deck plate (not to scale).

Advantageous

The advantages of thick-plate trough bridges:

- **High vehicle headrooms** and clearances are possible thanks to the lower structural height compared to conventional trough bridges because it is possible to dispense with crossbeams (crossbeam height 360-500 mm).
- **Short traffic-interruption times**, easy fabrication and fast installation thanks to high level of prefabrication.
- **Reduced noise emissions** and thus less noise nuisance thanks to the heavy foundation plate.
- **Good maintenance conditions** thanks to the flat and homogeneous bridge undersides.
- **Life-cycle assessment benefit**, plus sustainability.



Low structural height assures slender design and high headroom – ideal for urban and inner-city areas.

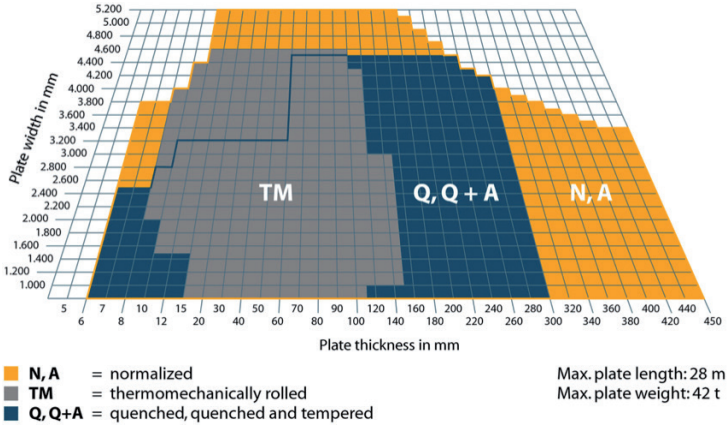
DILLINGER MAKES IT POSSIBLE

The requirements

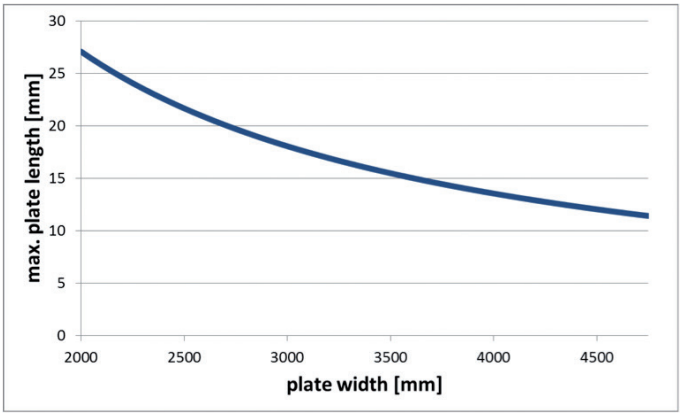
Grades S275NL/ML or S355NL/ML in accordance with EN 10025, Parts 3 and 4 are generally used for the deck plate (plate thickness ~ 100 mm). Plates of particularly great widths are popular here in order to avoid joints in the deck plate. Where a deck plate joint is unavoidable, the weld should be transverse to the direction of train and positioned at the one-third point, referred to bridge length, and must be tested for its fatigue strength.

DILLINGER HPQ-qualified

Plates from Dillinger, thanks to the large range of dimensions and formats available, frequently make it possible to avoid, or at least reduce to a minimum, transverse and longitudinal joints in thick-plate trough bridges, also achieving, simultaneously, an improvement in fatigue performance. Grades S275NL/S355NL can, for example, be supplied in maximum plate weights of up to 42 t and in plate widths of up to 4,750 mm, while Grades S275ML/S355ML are available up to 35 t and 4,600 mm. Depending on the flatness requirements also plates with widths up to 5,200 mm can be realized. Additionally, e.g. for deliveries of heavy plates in German railway bridge projects, a Manufacturer-related Product Qualification (HPQ) is necessary. Dillinger naturally possesses this qualification for the entire DBS 918002-02 thickness range (for S275NL/S355NL in accordance with EN 10025, Part 3, up to 250 mm and in accordance with EN 10025, Part 4, for S275ML/S355ML up to 120 mm).



The following maximum plate lengths are available for a 100 mm thick plate in Grade S355NL, assuming a maximum plate weight of ~ 42 t



DILLINGER Extras

For the typical plate thicknesses of approx. 100 mm used in thick-plate trough bridges, Dillinger also provides guarantees for ultrasonic inspections up to Class S_3/E_3 in acc. with EN 10160, and Z35 (through-thickness) properties in acc. with EN 10164.

Proven time and time again

Thick-plate trough bridges have been a tried-and-proven bridge type in Germany for many years, and are preferred for construction in urban and inner-city areas for bridges with small spans (<10 m), thanks to their many and diverse advantages. Spans may be up to >20 m, the majority of such bridges having spans of less than 10 m, however. This advantageous bridge type is now also frequently selected in other European countries. Two excellent examples of thick-plate trough bridges are the Dohnaische Straße overbridge, in Pirna (previous page; © Stahl- und Brückenbau Niesky GmbH) and the Sterndamm overbridge (front and back page).

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