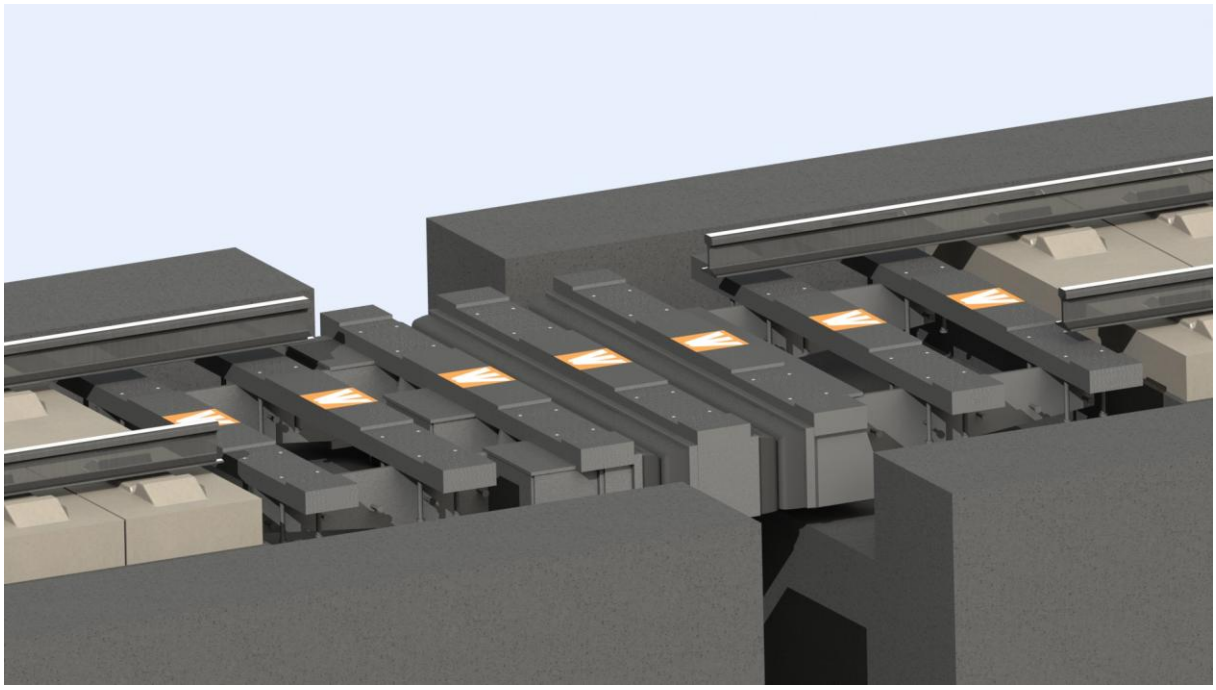
MAURER Railway-Expansion Joint

Guided Cross-Tie System



At the ends of railway bridge decks displacements occur which are caused not only by changes in temperature, but also by concentrated acting live loads. These displacements can cause stresses in the rails. In particular in case of a non ballasted track the resulting vertical displacements and rotations cannot be accommodated by the resilience of the ballast, but required is a suitable bridging system. The objective is to allow a free vertical displacement in combination with a longitudinal displacement at the ends of the superstructure, as well as a limitation of the vertical forces in the supporting points of the rails while maintaining the passing comfortable. In consideration of the permissible spacing of the sleepers, Maurer Söhne adapted the "swivel joist joint system" which is being used for decades in road bridges to the requirements of railway bridges. The durable solution is named "Guided Cross-Tie System" (MAURER MS) and is characterized by the following points:

- Longitudinal displacements of the superstructure of up to 1,600 mm possible
- Compact design while facilitating a large movement capacity
- Controlled spacing of sleepers caused by "non-floating support"
- Covering all usually occurring end rotations and mutually vertical displacements of the superstrucure of a non ballasted track
- Torsional resilience and little constraints by way of independently acting supporting axes
- Installation possible also in extreme curves and in a longitudinal slope
- No limitation of the passing velocity of the train
- Long term wear resistant, fatigue proof, and water-tight
- Wearing parts can be replaced from below
- Safe anchorage against uplift in the concrete
- Independent of the type of the fixation of the rails
- No gapping in the supporting elements possible

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So called Guided Cross-Tie Systems which are individually guided take care of the traffic loads and the movement of the superstructure. These sleepers are prestressed on two skewly positioned support beams below, and at least partially supported in sliding. A third support beam is in charge of the control of the displacements. These support beams are themselves supported on rocker bearings which are located at the edge of the superstructure. The guiding mechanism at these bearings leads to a swiveling movement of the support bars when the superstructure undergoes a longitudinal displacement, while ensuring an equal spacing between the sleepers. Vertical displacements between the edges of the superstructure can be accommodated by way of rotation of the bearings. The bending strain in the rails is being allocated equally to the two edges, in case of rotations around the longitudinal axis of the structure the system can freely rotate, which is facilitated by the two separate supporting axes. Each moving sleeper is separately controlled, and thus the system employs redundancy in case of local damages.

The installation of the Guided Cross-Tie Systems is being done by one single unit, inclusive of the connecting structures to the edges of the superstructure. The adaption to its final position is thus easily possible and thus not require any final adjustments.

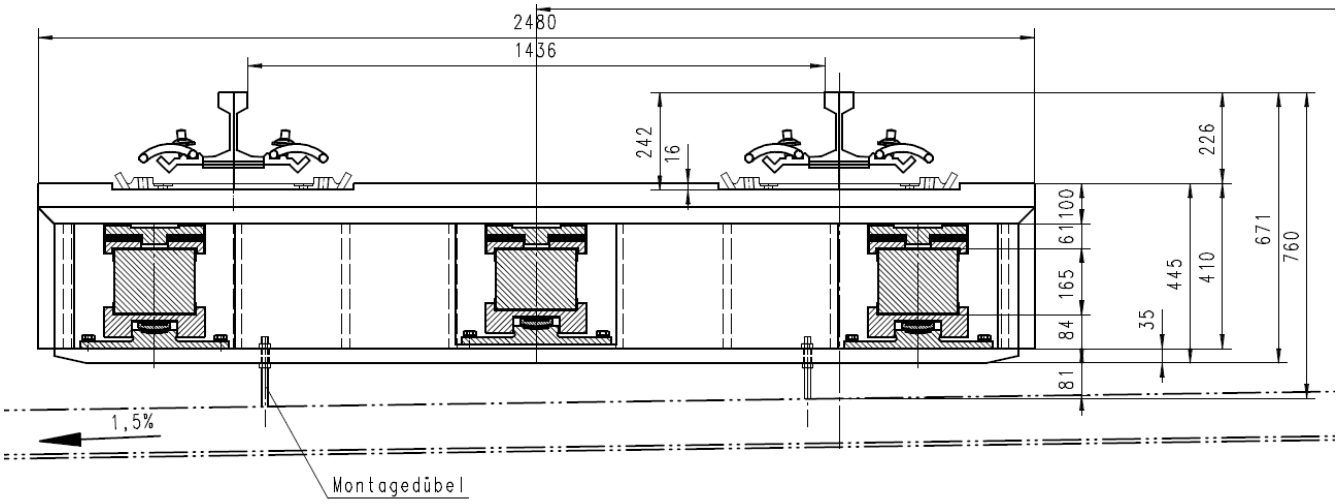

Fig: 1: Section through the MAURER Guided Cross-Tie System Type MS 1

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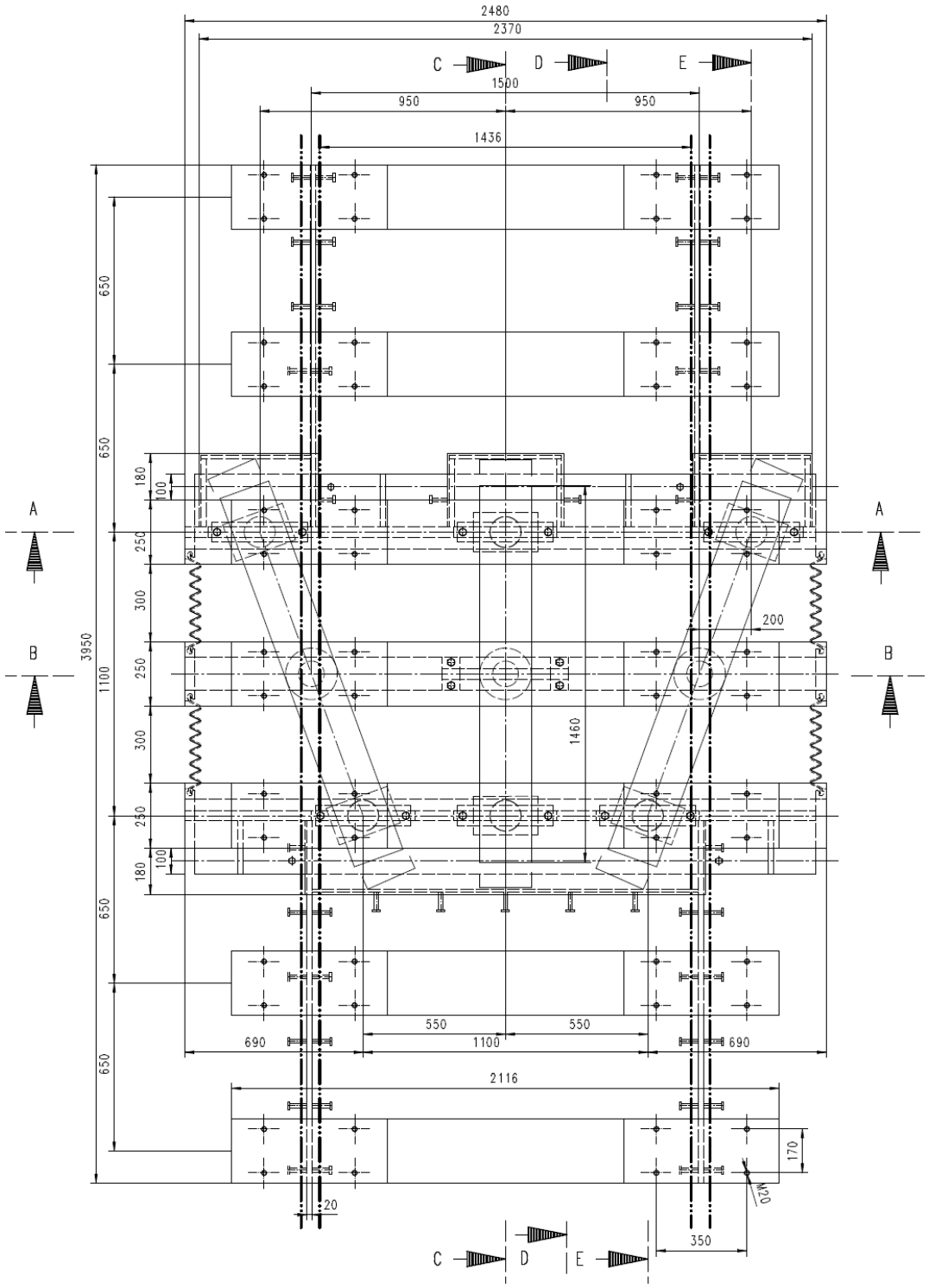

Fig: 2: Ground View of the MAURER Guided Cross-Tie System MS 1

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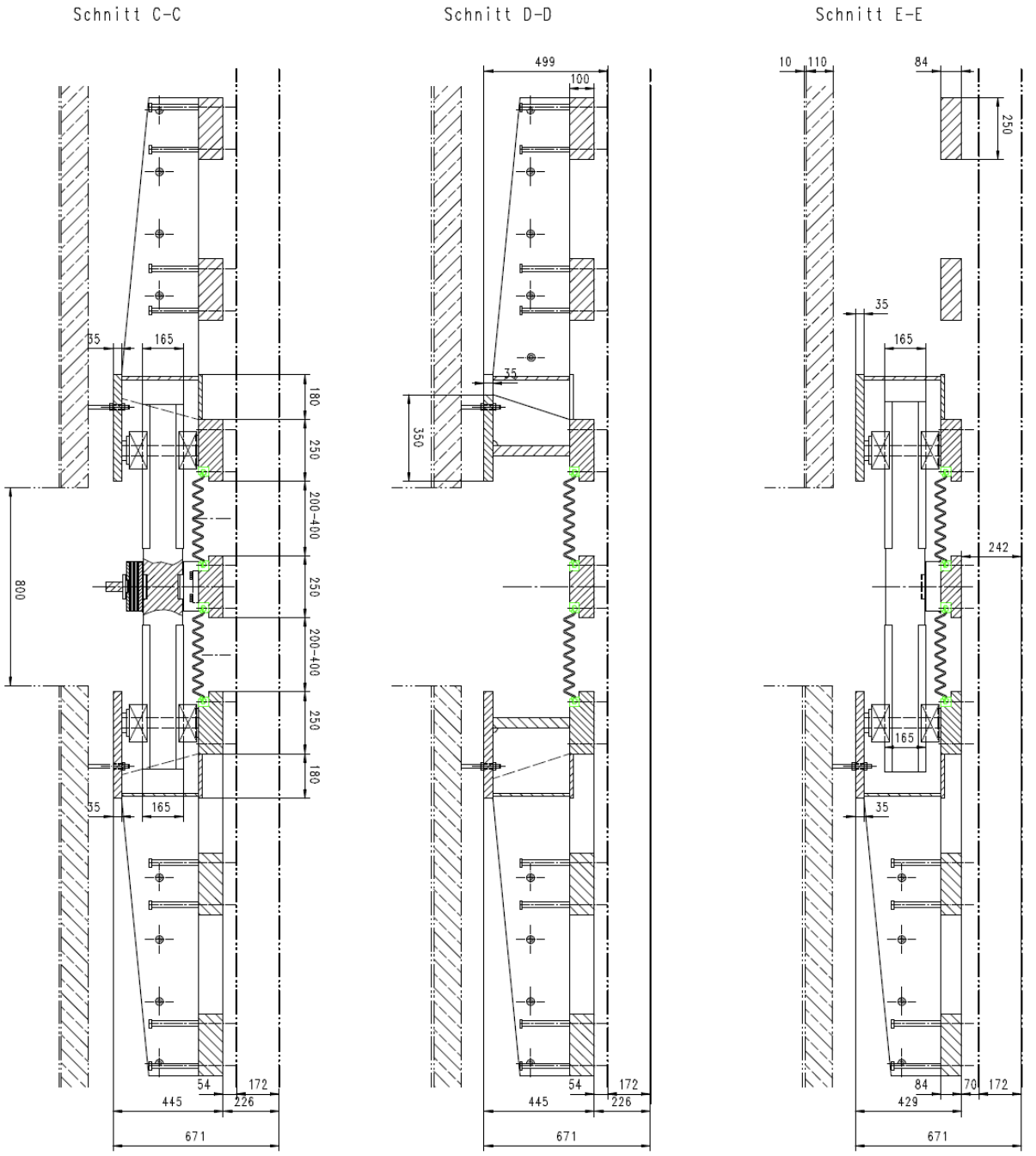

Fig 3: Sections of the MAURER Guided Cross-Tie System MS 1