S-Shaped-Sleeper Concrete-Bed Track with Resilient Pad
- Cost Reduced and Construction Time Shortened -

RTRI has developed S-shaped-sleeper concrete-bed track. This track is easier to construct and cheaper than existing concrete-bed track.

【Outline】
RTRI has developed s-shaped-sleeper concrete-bed track with rubber pad in order to reduce the construction cost of existing concrete-bed track. Major points of this development are as follows. (Fig. 1)

1. This track supports lateral load with shear key on the side of the rail and therefore the width of the concrete track bed is thinner and its material cost is lower than existing solid-bed track.
2. Since this track uses short-fiber-reinforced concrete and has a structure proper to unreinforced concrete track bed, additional reinforcing bars except the displacement guide have become unnecessary.
3. Its formwork placement and alignment has been made simpler so that accurate shapes of concrete track bed can be determined only by pressing the formwork to the end of sleepers and shear keys.
Since the workload to construct this S-shaped-sleeper track is smaller than that of D-shaped-sleeper track, its construction periods can be shortened by more than 40%. In addition, as its material cost can also be reduced, the construction cost of the concrete track bed and of the entire track can be cut by 60% and 20% respectively.

**Commercial application**
This S-shaped-sleeper track was already introduced to commercial track of a rail operating company in the end of 2016. We will prepare a handbook for its design and construction in half a year, and will further promote its practical use.

**Background of development**
Concrete-bed track with rubber pad is one of ballastless tracks which supports sleepers with elastic materials such as rubber pad placed between track bed and sleepers.
Since this type of track reduces noise and vibration generated by running trains, it has been used mainly on elevated tracks in urban areas.

The D-shaped-sleeper concrete-bed track that RTRI developed in 1998 has also been widely utilized on JR and other private railway lines and the total length of the D-shaped sleeper track has amounted to 60 km. But the complicated placement and precise alignment of reinforcing steel and formwork requires a lot of work when constructed. (Fig. 2) In order to reduce the construction cost and to expand the use of concrete-bed track, RTRI has developed the S-shaped-sleeper track which is easier to construct.

We have conducted real-vehicle-weight loading tests and non-linear FEM analysis in order to check its performance and confirmed that this track has sufficient strength to bear train load. Through running tests with motor cars, we have also confirmed that it has the same level of basic performance as the D-shaped sleeper track.