

**Development of Unloosening Rail Fastening System with Leaf Spring Clip
and Existing Concrete Sleeper**

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Rail fastening systems using leaf spring clips and bolts are widely used in Japan. This rail fastening system requires regular maintenance to prevent the bolts from loosening. Some railway companies are replacing rail fastening systems using leaf spring clips with boltless rail fastening system using round bar clips in order to eliminate the need for re-tightening of bolts. This replacement involves replacing existing concrete sleepers with dedicated sleepers for round bar clips. Therefore, some railway companies find it difficult to introduce boltless rail fastening systems using round bar spring clips due to construction costs and labor. In response to this problem, we have developed unloosening rail fastening systems using leaf spring clips and existing concrete sleepers.