
Subject: How to model speed restrictions for ETCS train categories based on axle load

Posted by [Jörgen Strandberg](#) on Thu, 14 Sep 2017 08:55:41 GMT

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Hi,

Our configuration tool has an internal data model that pretty much models data for ETCS "Packet Number 51: Axle Load Speed Profile" (speed restrictions for trains with axle load higher than or equal to the specified value). For ETCS baseline 2 these axle load values are given in halves of tons.

We are just about to add a railML export feature to our configuration tool. I'm now looking at how to - on the railML v2.2 format - represent these speed restrictions for specific train categories based on axle load.

Looking at the railML v2.2 types it seems that IS:speedChange would be a good way to represent the places where the speed restrictions change. And as a type of train category based on axle load cannot be directly specified in an IS::speedChange, an additional IS:speedProfile with an appropriate maxAxleLoad value could be created and referenced.

But the train category given by a maxAxleLoad value is different from the one given by the same axle load value in Packet Number 51 in ETCS baseline 2.

I feel the need for discussing a best practice of representing this data on the railML v2.2 format.

I have put together the simple example below, followed by a suggested modeling in railML v2.2

- Should speedProfile instances additionally specify maxAxleLoad, and if so what values are relevant in the example?
- How can the end of speed restrictions be modeled, e.g. the one for trains with axle load above 17.5 tons in the example should end at 500 m?

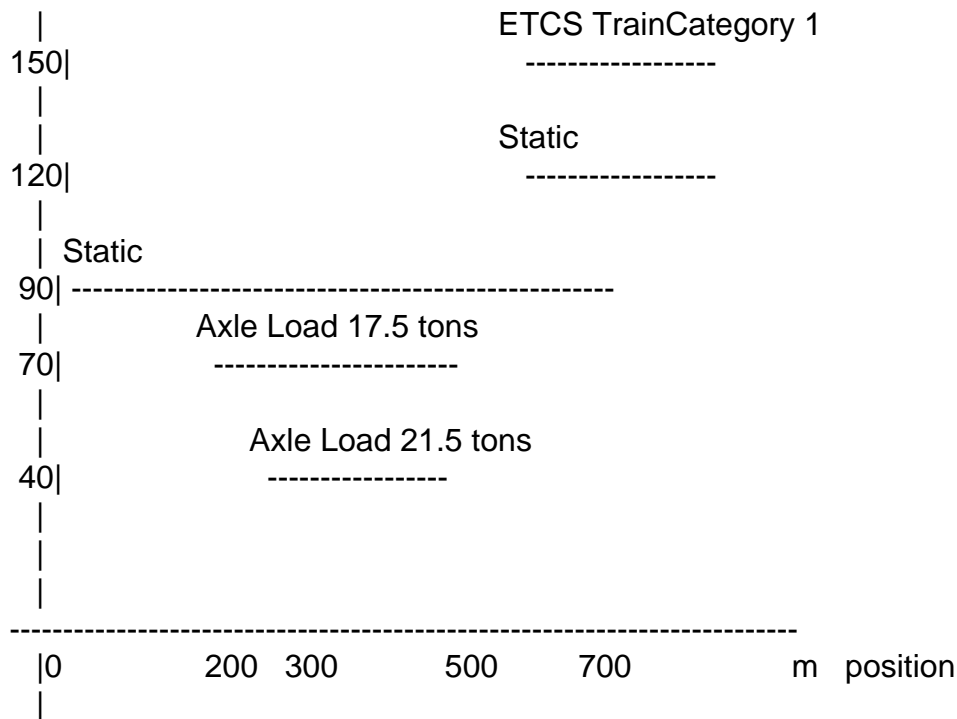
Regards,
Jörgen Strandberg

Example

" Along a railway line, in nominal direction (increasing position values), where the static speed is normally 120 km/h, a length of 700 m is affected by a static speed restriction of 90 km/h. Within this length there is a second speed restriction for trains with an axle load above 17.5 tons and a third speed restriction for trains with an axle load above 21.5 tons. After the 700 m the static speed restriction is lifted and additionally trains of ETCS category 1 are allowed to go at 150 km/h."

Speed restriction

km/h



```
<?xml version="1.0" encoding="UTF-8"?>
<railml xmlns="http://www.railml.org/schemas/2013" version="2.2">
  <infrastructure description="Example track with speed changes."
id="_UkCL4HkXEeeiLuHTeo5DKA" xml:lang="en-us" name="Straight Track">
    <tracks>
      <track id="_tZBxslfMEee4Lbqvey4DcQ" name="BS1_BS2">
        <trackTopology>
          <trackBegin absPos="0" id="_QXGs4lypEeeyKJfSTpocjg" pos="0">
            <bufferStop id="_iVgZ4lfMEee4Lbqvey4DcQ" name="BS1"/>
          </trackBegin>
          <trackEnd absPos="1000" id="_QXP20lypEeeyKJfSTpocjg" pos="1000">
            <bufferStop id="_h12CYlfMEee4Lbqvey4DcQ" name="BS2"/>
          </trackEnd>
        </trackTopology>
        <trackElements>
          <speedChanges>
            <speedChange id="_Ui_qEHkXEeeiLuHTeo5DKA" name="spu_BS1_BS2_0" absPos="0"
pos="0" dir="up" vMax="90"/>
            <speedChange id="_Ui_qEXkXEeeiLuHTeo5DKA" name="spu_BS1_BS2_200_axl17.5"
absPos="200" pos="200" dir="up" profileRef="_Ui_qFXkXEeeiLuHTeo5DKA" vMax="70"/>
            <speedChange id="_Ui_qEnkXEeeiLuHTeo5DKA" name="spu_BS1_BS2_300_axl21.5"
absPos="300" pos="300" dir="up" profileRef="_Uke30nkXEeeiLuHTeo5DKA" vMax="40"/>
            <speedChange id="_Ui_qE3kXEeeiLuHTeo5DKA" name="spu_BS1_BS2_700"
absPos="700" pos="700" dir="up" vMax="120"/>
            <speedChange id="_Ui_qFHkXEeeiLuHTeo5DKA" name="spu_BS1_BS2_700_ETCS1"
absPos="700" pos="700" dir="up" etcsTrainCategory="1" vMax="150"/>
          </speedChanges>
        </trackElements>
      </track>
    </tracks>
  </infrastructure>
</railml>
```

```
</trackElements>
</track>
</tracks>
<speedProfiles>
  <speedProfile description="ETCS baseline 2 train category with axle load above 17.5 tons"
id="_Ui_qFXkXEeeiLuHTeo5DKA" name="Trains 17.5tons" influence="decreasing"
verbalConstraint="Trains with axle load > 17.5 tons"/>
  <speedProfile description="ETCS baseline 2 train category with axle load above 21.5 tons"
id="_Uke30nkXEeeiLuHTeo5DKA" name="Trains 21.5tons" influence="decreasing"
verbalConstraint="Trains with axle load > 21.5 tons"/>
</speedProfiles>
</infrastructure>
</railml>
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