Subject: SI units in railML 3.x
Posted by Vasco Paul Kolmorgen on Mon, 15 Jan 2018 10:07:57 GMT
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Dear all,

happy new year to all of you that I haven't met so far!

Following the railML 3.1 dissemination workshop we had last week in
Berlin, we restarted the discussion about using SI units in railML
whenever possible.

What does it mean:
SI units are defined as International System of Units [1] and their
original purpose was to harmonize usage of physical units in various
disciplines. For example, lengths are defined in metres, masses is
kilogram and electric currents in ampere.

railML shall follow this SI approach based on a "golden rule": SI units
shall be used everywhere except when common usage principles in the
railway sector ("state of the art") define it differently. One example
for such an exception: speeds are defined in km/h instead of m/s.

I would like you to name further exceptions by simply answering on this
post. For example: how about the track gauge? Have it in metres (SI) or
in mm (not SI)? The Trac ticket #317 [2] summarizes this issue.

[1] https://en.wikipedia.org/wiki/International_System_of_Units
[2] https://trac.railml.org/ticket/317

Thank you very much and best regards,
Vasco--
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F-Up: railML.misc

Subject: Re: SI units in railML 3.x
Posted by   on Tue, 16 Jan 2018 20:15:13 GMT
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Dear Vasco,

the first (and most strange example of non-SI-units in railways) I think of is: Brake abilities of

railway vehicles are not measured in m/s² but in tons ("braking mass" compared to a certain "default braking carriage" of 192x). They are printed on each UIC/RIC vehicle; any attempts to standardise them with SI units failed on the huge task of re-labelling all European wagons - and on the lack of agreement of all members.

The pressure of air (brakes) or steam (boilers, cylinders) is measured in atm instead of Pa.

There are plenty of examples of "scaled" usage of SI units such as you already mentioned: Distances in km instead of m, gauges in mm instead of m, speeds in kph instead of m/s, times in minutes instead of seconds, masses in tons instead of kg, forces in kN instead of N, power in kW instead of W, voltages in kV instead of V. I think railML does not need to care much about but apply them freely as usual in railway sector without regarding it as "break of the golden rule" - they are still SI if they are scaled with SI factors such as "kilo" or "mega"!

I think a good example is the XML dateTime type which already allows a free usage of time derivatives from seconds to minutes, hours, days, years... If railML would really very strictly apply the "golden rule", we would need to drop all dateTime and use seconds only for all times and periods... Which would of course not be practical.

Additionally to this "common" usage principles in the railway sector, there are some "local", not world-wide common usage principles. But they may be of such importance in their part of the world that possibly railML cannot ignore them.

Is it agreed that distances of railway lines in railML must be measured in metrical units? There are parts of the world where they are commonly measured in miles(decimal) or miles+chains. It may not always be practical to convert them into metrical units and back because of the rounding error.

I could imagine, for instance, that any location spot (element) along a railway line could have, additionally to its obligatory relative position in metrical units, a "nominal" position in other units, to avoid backwards conversion.

The same applies to speeds (mph instead of kph), heights (metres or feet) and radii of curves (metres or chains (UK) or "Degree of curvature" (US)).

Does anybody have seen a speed sign of 96.6 kph in UK? ;-) I don't think so. Wouldn't it be good for railML to know whether the sign is actually labelled as "97" or "60"? I think it would be even necessary for some use cases.

Best regards,
Dirk.

Subject: Re: SI units in railML 3.x
Posted by Ferri Leberl on Tue, 22 May 2018 12:34:48 GMT
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Dear all,

I have listed the simple types that are connected with units in
https://trac.railml.org/ticket/317#comment:3
(for railML version 2.3)

It seems, that several simple Types are never used:
 tWeightKG tSpeedMPerSec tAngleDeg
One could argue that these simple types can be removed, as they are not used, on the other hand, two of them use are SI units, so removing them would thwart the idea of converging towards SI units.

As Dirk Bräuer mentioned, in some cases it is not preferable to convert values between different units because of rounding errors.

A possible rule could be to keep non-SI units which are prone to rounding errors (e.g. km/h, miles per hour), but to remove non-SI units that where rounding errors are unlikely (e.g. millimetres can be converted into meters with mere point shifting). Further examples are

I hope to hear your opinions soon.

Yours, Ferri Leberl

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Subject: Re: SI units in railML 3.x
Posted by   on Tue, 22 May 2018 14:03:32 GMT
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Dear Mag. Leberl,

thank you for the clarification.

I reviewed the list roughly and have the following notes:

 - tBrakePercentage is surely no SI unit; you can change the ? to a n(o).

 - I don't unterstand why tVMax should be SI. It is documented (in the XSD) as "maximum allowed speed in km/h". In my opinion, the SI unit for speed would be m/s, not kph. Additionally, this type should be renamed and unified with (the already existing) tSpeedKmPerHour.

- I'd like to suggest to split tLengthMM into two different grades of non-SI: Where it is used for tRadiusChange/@superelevation, it is the wrong unit at all. Superelevation is an angle an the SI unit for angles should be radiant, not mm. Therefore, here mm is used "wrongly" (but of course agreed) for an angle. The other instances of tLengthMM it may (metres) or may not (milli) be SI in a rather harmless way.

- I regard tEffortNewton as a mistake and think it should be unified to tForceNewton in future.

This is by far no complete reply. I may found more remarks in future but currently I don't have more... ;-)

With best regards,
Dirk.

Subject: Re: SI units in railML 3.x
Posted by Joerg von Lingen on Tue, 29 May 2018 14:39:36 GMT
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Dear all,

yes, the tEffortNewton shall be transformed to tForceNewton. In the end it is the same definition with the unit Newton.

Best regards,
Joerg v. Lingen

Rollingstock Coordinator

On 22.05.2018 16:03, Dirk Bräuer wrote:
> I regard tEffortNewton as a mistake and think it should be unified to tForceNewton in future.

Subject: Re: SI units in railML 3.x
Posted by Ferri Leberl on Sun, 25 Nov 2018 10:49:59 GMT
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Dear All,

As described under Dev:Units, units can now be found in Category:Unit, as long, as they are set up with Template:Unit.

So, for version 2.x the issue is settled in my view, comp. #317#comment:5.

Yours, Ferri Leberl

Subject: Re: SI units in railML 3.x
Posted by Thomas Nygreen JBD on Thu, 20 Dec 2018 15:23:18 GMT
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Dear all,

 - tBrakePercentage is surely no SI unit; you can change the ? to a n(o).

Brake percentage is unitless.

 - I don't unterstand why tVMax should be SI. It is documented (in the XSD) as "maximum allowed speed in km/h". In my opinion, the SI unit for speed would be m/s, not kph. Additionally, this type should be renamed and unified with (the already existing) tSpeedKmPerHour.

I agree. Just a question: what unit is used to measure and regulate railway speeds in the UK?

 - I'd like to suggest to split tLengthMM into two different grades of non-SI: Where it is used for tRadiusChange/@superelevation, it is the wrong unit at all. Superelevation is an angle an the SI unit for angles should be radiant, not mm. Therefore, here mm is used "wrongly" (but of course agreed) for an angle.

In railways, I have only seen superelevation/cant measured in mm. It is also documented in the wiki: "superelevation The superelevation of the track in millimeters, which is either valid exactly at this point of from here until the next radiusChange element. The superelevation shall be given in whole mm. / Die Überhöhung eines Gleises in Millimeter. Modelliert wird die Überhöhung entweder exakt an dieser Position oder aber für den hier beginnenden Gleisabschnitt bis zum nächsten radiusChange Element. Die Überhöhung sollte stets in ganzen Millimetern angegeben werden." So when the outside rail is 100 mm higher than the inside rail @superelevation="100" not "0.069573" (on standard gauge).

All formulas involving cant in the official Norwegian design rules use millimeters. I also checked wikipedia, which uses millimeters in the examples: https://en.wikipedia.org/wiki/Cant_(road/rail) .

Best regards and happy holidays,
Thomas