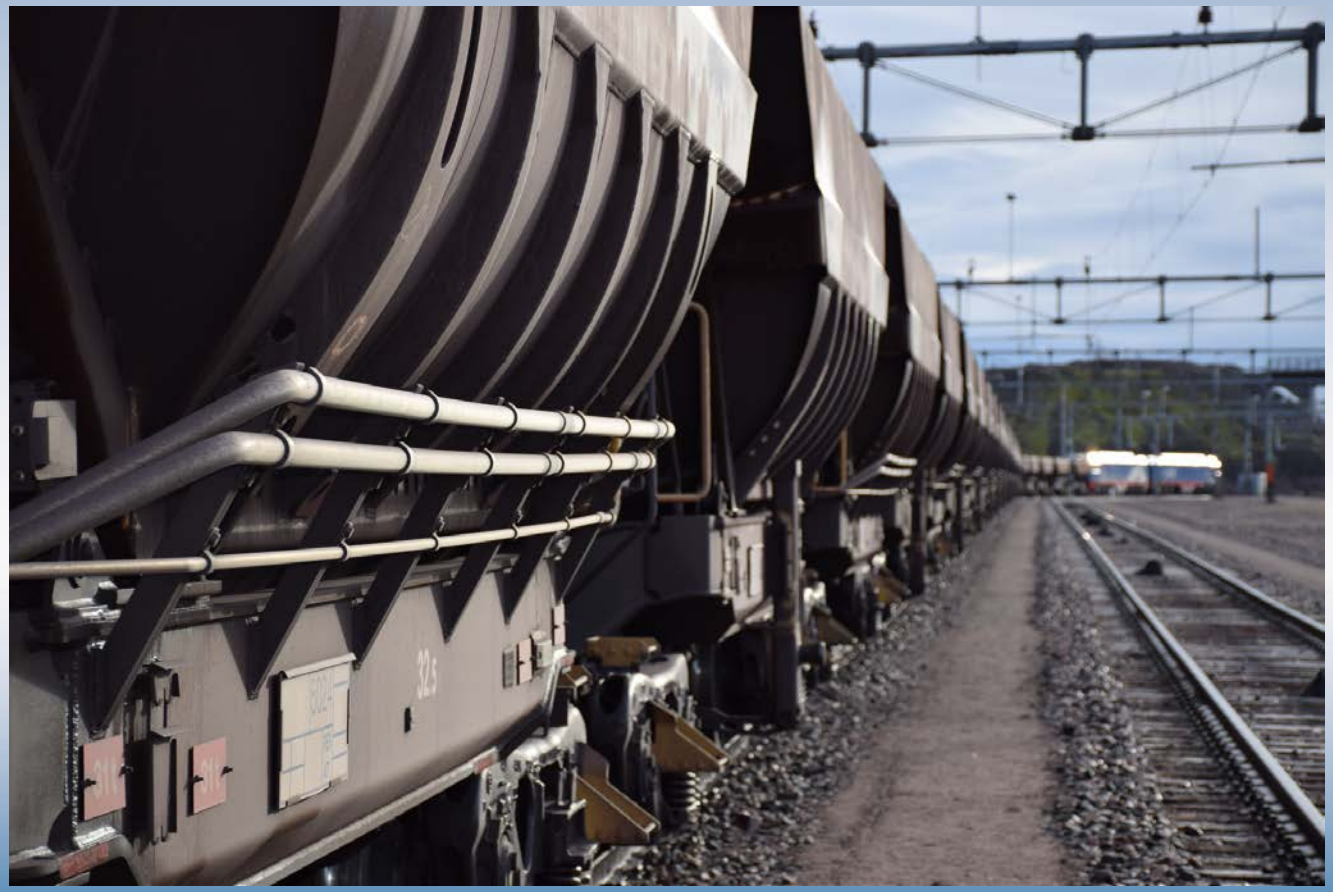
SKANDINAVIENS NORDLIGASTE
tekniska universitet

Increased Axle Load to 32.5 ton – what Operational and Maintenance effects will it have for the Rolling Stock?



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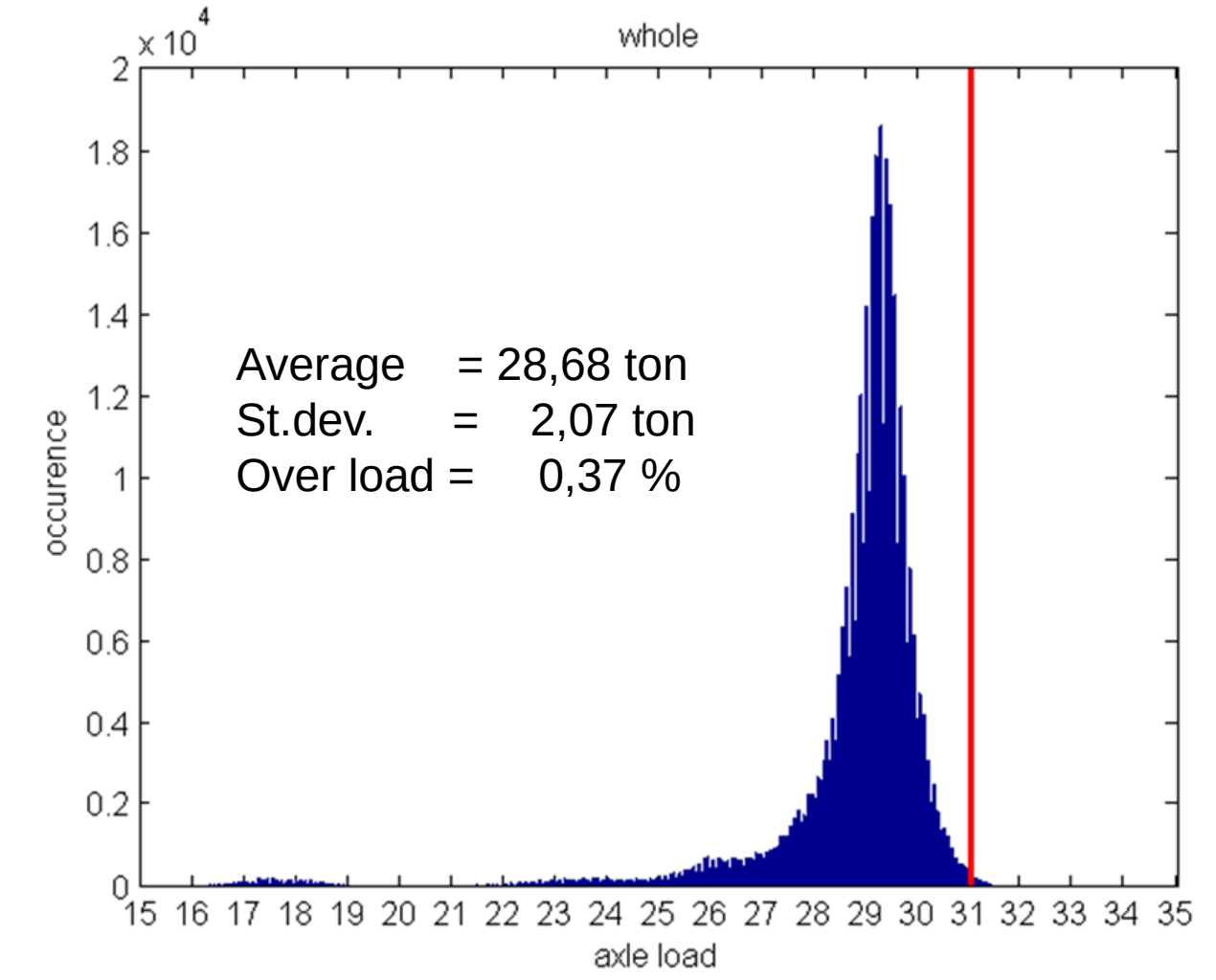
Introduction

- LKAB want to increase the capacity by increasing the axle load from 30 to 32,5 ton.
- A test train was decided to go from Malmberget to Luleå once a day in train slot 9959.
- 80 ore cars was dedicated to this test.
- Restriction – no axle load above 32,5 ton.
- The test started September 1:th 2015 and was to be concluded after 1 year.

Axle load spectrum at 30 tons operation



Result from the 32,5 tons test train

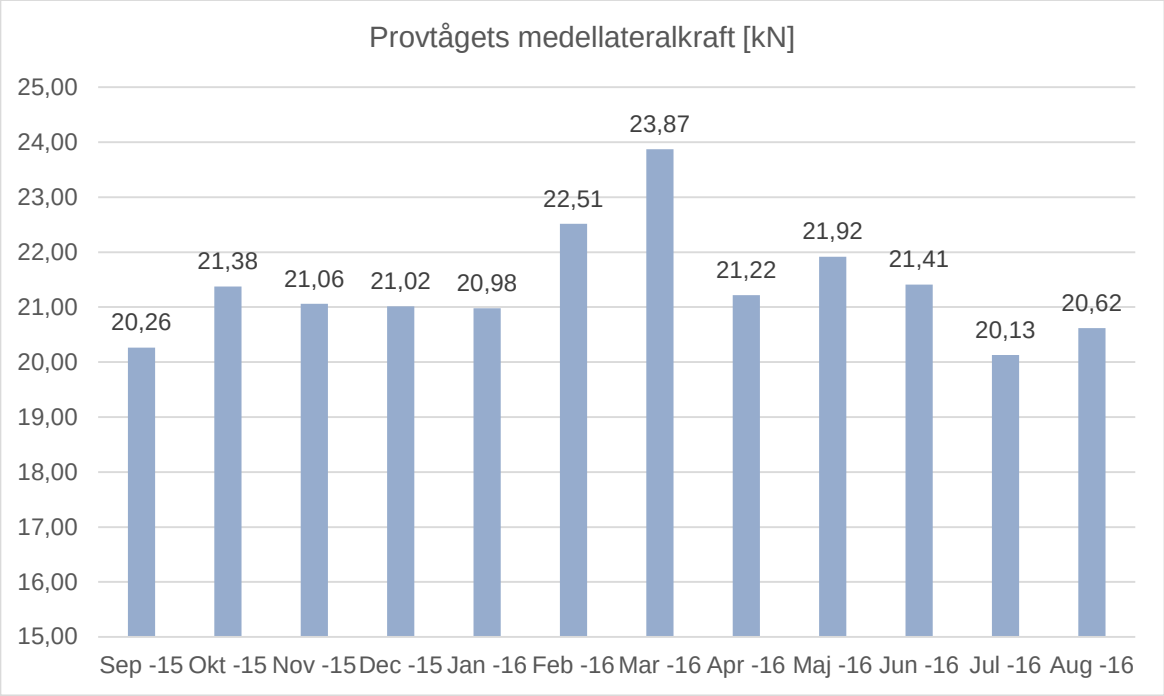
	SnittAxel last	Brutto Tonnage	Netto tonnage	Snitt last tåg	< 30 Ton	30 - < 31	31 - < 32	>=32 - 32,5
September	31,0	244 693	202 295	6 976	650	1 768	4 176	482
Oktober	30,9	225 862	186 388	6 926	1 066	2 150	3 522	310
November	30,8	201 056	164 506	6 588	708	2 976	2 582	254
December	31,0	151 804	125 488	6 972	370	1 640	2 468	418
Januari	30,8	184 146	151 982	6 908	1 180	1 904	2 480	420
Februari	30,5	191 060	157 434	6 845	1 286	2 912	1 910	148
Mars	31,2	142 066	117 212	6 992	368	1 146	2 552	494
April	31,3	221 011	182 999	7 038	424	1 722	3 794	1 132
Maj	31,1	50 547	41 775	6 963	250	364	804	214
Juni	31,4	85 306	70 686	7 069	216	662	1054	788
Juli	30,9	142 777	117 923	6 937	486	1982	1892	264
Augusti	31,0	143 203	118 349	6 962	460	1584	2204	376
SUMMA	31	1 983 531	1 637 037	6 931	7 464	20 810	29 438	5 300
%-andel					12%	33%	47%	8%

Result from the 32,5 tons test train

- The test train weighed in average 546 ton more than an average train did before the test started.
- The test train consumed 1 % more energy than the ordinary train.
- The heavier test train had no problem to keep the same time table as the ordinary trains.
- The ore cars travelled 107.600 km and no difference in maintenance action has been observed.

Result from the 32,5 tons test train

- The JvtC research station measured the train forces and compared it with ordinary trains. The heavier test trains (5,6 %) had in average 6,9 % higher lateral forces.



Summary

- The objective was to increase the axle load from 30 to 32,5 ton = 8 %
- The actual result was that the axle load increased from 28,7 to 31,0 ton = 8 %
- No significant (negative) impact have been observed for the 32,5 ton test train.
- One train, once a day, for one year, might be to little to see any long term trends.
- It can also be so that the change in axel load lays well within any critical thresholds.

Discussion

- To reach higher axle load would require that the absolute over load limit redefines and/or that the load spectrum can be narrowed.
- Note however that the accuracy for the train scales is 1 % which corresponds to 1,3 ton for a 32,5 tons ore car.
- Questions?