

Ergonomic characterization of wood harvesting systems in Russia

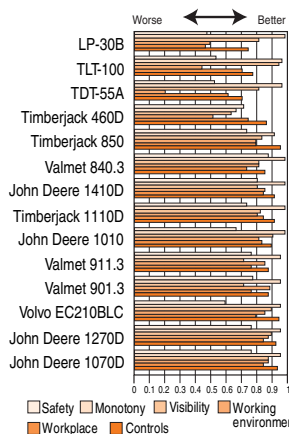
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Abstract

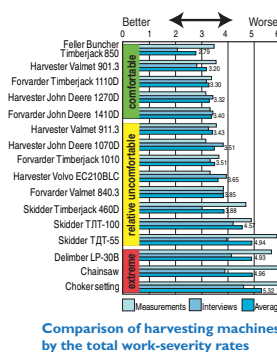
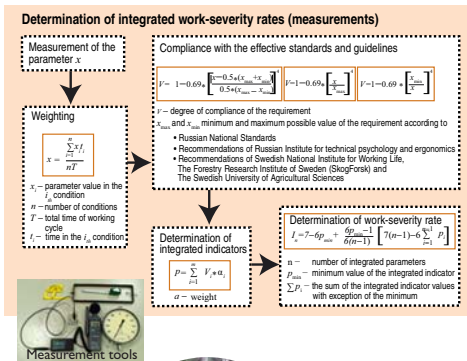
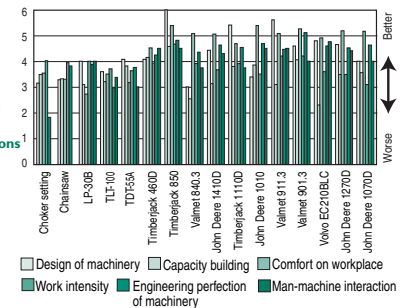
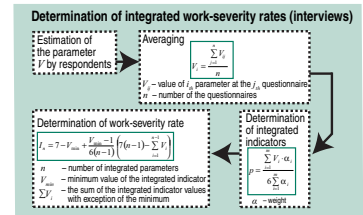
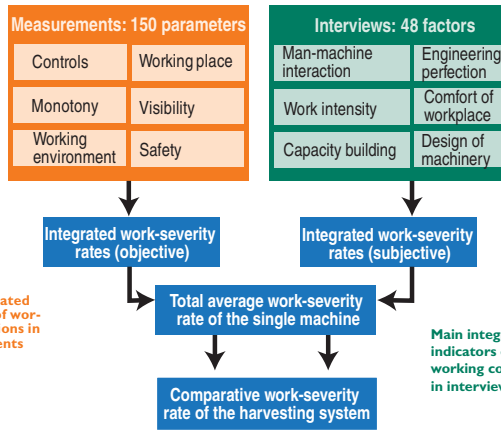
A comparison of 14 currently applicable wood harvesting systems was assessed with respect to ergonomic point of view. For this purpose, the research method, based on the Hodge-Leman principle and the integrated work-severity rate of single machinery, was developed for ergonomic evaluation of cut-to-length, tree-length and full-tree harvesting systems. Altogether, about 150 different parameters of 36 units of equipment that impact on the ergonomics and work conditions were measured and estimated in interviews undertaken directly at forestry harvesting workplaces in 15 logging companies. Then the results were compared to the effective norms, and the degree of compliance with the stipulated values was determined. The estimates obtained for the degree of compliance were integrated. This permits a direct comparison of the workload on forestry harvesting workers such as operators, lumberjacks and choker setters. In many respects, the current ergonomic standard is good, except for the operators of cable skidders, chainsaws and choker settings. Visibility and work postures were considered to be the most critical features influencing the operator's performance. Problems still exist, despite the extensive development of cabs. The best working conditions in terms of harvesting systems were provided by "harvester + forwarder" in cut-to-length harvesting, and "feller-buncher + grapple skidder" in full-tree harvesting. The motor-manual tree-length harvesting performed with cable skidders showed the worst results in terms of ergonomics.



1 Timberjack (left) 850 Feller Buncher and (right) 460D Skidder
2 Choker
3 Chainsaw
photos 1 and 2. @ A. Sokolov & V. Katarov
photo 3 @ Metla/Erkki Oksanen



Method and data



Comparison of wood harvesting systems

Wood harvesting system	Total work-severity rates of the single machines	Value of the criterion
	West	Lapland
1 John Deere 1270D → John Deere 1410D	3.32 3.40	3.40 3.36 6.76
2 John Deere 1070D → John Deere 1010	3.51 3.51	3.51 3.51 7.02
3 Volvo EC210BLC → John Deere 1410D	3.65 3.40	3.65 3.53 7.18
4 Valmet 901.3 → Valmet 840.3	3.20 3.85	3.85 3.53 7.38
5 Valmet 911.3 → Valmet 840.3	3.44 3.85	3.85 3.65 7.50
6 Timberjack 850 → 2 Timberjack 460D → Volvo EC210	2.80 2x 3.88 3.65	3.88 3.55 7.43
7 6 fellers → John Deere 1410D	6x4.96 3.40	4.96 4.74 9.70
8 Feller → chokersetter → TLT-100 → LP-30B	4.96 5.32 4.57 4.93	5.32 4.95 10.27
9 Feller → chokersetter → TDT-55A → LP-30B	4.96 5.32 4.94 4.93	5.32 5.04 10.36
10 Feller → chokersetter → TLT-100 → delimiting/bucking worker → John Deere 1410D	4.96 5.32 4.96 4.57 3.4	5.32 4.64 9.96
11 Feller → 2 delimiting workers → chokersetter → TLT-100	4.96 2x 4.96 5.32 4.57	5.32 4.95 10.27
12 Feller → 2 delimiting workers → chokersetter → TDT-55A	4.96 2x 4.96 5.32 4.94	5.32 5.03 10.35
13 Timberjack 850 → 2 chokersettors → 3 TLT-100 → 2 LP-30B	2.80 2x 5.32 3x4.57 2x4.93	5.32 4.63 9.95
14 Timberjack 850 → 2 chokersettors → 3 TDT-55A → 2 LP-30B	2.80 2x 5.32 3x4.94 2x4.93	5.32 4.77 10.05



1 John Deere 1070D
2 Volvo EC210BLC
3 Valmet 901.3
photos © A. Sokolov & V. Katarov



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