Cost and Soil Saving with Better Equipment and Planning

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Abstract:
Summary In the Nordic countries planning of harvesting operations is often done with main emphasis on the tree stand level. And average forwarding distance is calculated based on middle point for the volume. Terrain description could be present in the order but with minor quality and the half detailed operational planning is then handed over to harvesting crew. They have very little time for planning and are usually not paid extra for it and forwarding is paid by average distance from center of stand to the landing. Shortest travelling distance is more or less straight over the cutting area which could mean travelling over areas with less good bearing capacities which in turn mean usually severe soil disturbance. Rutting will increase the rolling resistance which in turn will cause increased fuel consumption and less forwarding speeds. The seldom acknowledged fact is that both unnecessary soil disturbances occurs and that the cost for the operator increases due to less production per hour but also increased fuel costs occurs. Wheel ruts extra 10 cm deeper may cost 0.1 liter per ton and hour (3 l/h for a normal forwarder). Advised main temporary roads on ground with good soil conditions may be up to 50 % longer than the shortest one but with less quality, and still be profitable. This is due to less rolling resistance but also that the operator can keep higher forwarding speed. Thus good planning of temporary roads should be done in relation to ground conditions and preferably in a second step close to the operation. One way could be to use a cone penetrometer which will give the actual soil strength. First to find better drawing of the main extraction roads where both ground structure and soil strength is good. Next step is to advice a proper machine size based on actual soil strength. By calculating actual ground pressures per axle on the loaded machine and compare with a model, right machine size could be ordered. The machine should fit to proper ground pressures for the weakest part along the main strip roads. Third step is to add bogey tracks to the machine which will reduce the ground pressures to the half. The employer could also suggest the best type of bogey tracks for the conditions, e.g. bearing or pulling capacity or for snowy conditions. For a medium sized forwarder better planning could mean 5 % higher production per hour but also 3-4 % less production costs. Thus, we suggest GIS maps to be used not only for stand conditions but also for actual ground situations to make drawings of main strip roads to best ground conditions. And then complement it with some ground measurement to advice the operators to use proper machines and equipment. This will save money both for the employer and the contractor.

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