

## FINE DEVELOPMENT OF THE FORESTS WITH MODERN HIGH ECONOMICAL EFFICIENCY SKIDDING EQUIPMENTS

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**Abstract:** *As the primary stage of the wood transport, wood skidding has an important weight in logging, because it is develop inside the forest and the silvicultural, ecological and economical exigencies are multifarious, and for many time, they are very hard to be realized in whole.*

*At the analyze of the opening – up process, as at the skidding means chose, it must be have in attention some aspect as: The wood mass are located, in many cases, in the upper side of the forest basins, where the fields are hilly and exposed to the directly and long time action of the climatic factors and the opening – up inside them with a permanent transport network is reduce or some time is absent. Also, the aspects regarding the sustainable and multifunctional management of the forest increase the attention to the improvement of the work technologies in the forest, with theoretical and practical effects generally to the logging management and especially to the wood mass skidding.*

### 1. Introduction

Wood skidding represents the process of wood transport from the cutting place to a permanent transport way. It is realized usually inside the forest, with different and complex effects to the environmental factors.

In the conditions of the Romanian forests from the mountain area, with steeply and fragile terrains and with marked declivities, the skylines for wood skidding should know a largest spread, so much that they are efficient and non – pollutant to the environmental factors.

The skidding means structure and extinction are connected with some factors, such as:

- the field conditions: the type, the declivity, the level of fragmentation a.s.o. and with the minimum negative effects of these means against them;
- the adopted logging technology and the volume of wood mass that have to be skidded;
- the cutting type: concentrated or spread on a largest forest area;
- the requests regarding the environmental protection;
- the skidding costs level and their proportion in the wood logging process;
- the tradition and the knowledge's in usage of some skidding means;
- the endowment with means and their technical performances;
- keeping the integrity of transported wood;
- the work productivity and the economical efficiency;
- the great flexibility regarding the skidding and transport installations and means with which are connected.

In Romania, by coming into beginning the private property of forests and also in logging, are recorded requests to the work techniques and technologies. The private forests owners own around 50% from the total forest area and the private loggers (more than 5000) harvest approximately 12 million m<sup>3</sup>. Many loggers use in many cases modest (simply) means, generally overtook and sometime they work with improvisations.

In these situations, used techniques and technologies are not in accordance with the above-mentioned requests. In time, probably after they will reach some money, they will be able to improve their capacities by buying modern means and installations that are necessary for a proper logging.

## 2. Modern equipment

However, in the last years, were bought, in a small number, some modern skidding means, made in foreign countries, such as: forwarders with trailer and hydraulic loader, skylines type Koller, Wyssen and others.

These skylines, which tend to have a larger extinction in our country, present some important advantages regarding the productivity and the efficiency as:

- move the load on the shorter way between the loading and unloading points;
- high mobility in placement and functioning;
- easy to adapt to loads with different length and
- are equipment which produce small damages to soil, seedling and remaining trees'

However, with all these advantages of these skylines, their usage in our country is very restricted because:

- the dispersion and fragmentation of the wood mass in places that do not justify such a solution from economical point of view (it is considered advantageous such an installation if the transported wood mass is higher than 0.5 m<sup>3</sup>/m of installation);
- the production and exploitation costs are enough higher;
- the access to these skylines is enough difficult, especially in winter time and in unfavorable atmospheric conditions;
- the necessity of a higher professional training and of a very attentive and accurate exploitation.

In the conditions of a reduced permanent transport network, these skylines have to unfurl on relative long distances, more than 2000m, in situations in which are not justified as work technique and technologies. In these situations, the skylines that can be used in Romania should have to be adapted to many logging and skidding situations and especially to the following aspects:

- a 400 –600m medium working distances, with lateral yarding possibilities on distances as much longer;
- the development of a transport network in the forest which is useful for wood skidding with the 400 – 600m skyline;
- some sure, facile and in shorter time mounting and dismounting possibilities;

The skidding lines types are considered in accordance with the operational structure of skidding and result by combining the possible modalities for yarding and forwarding. Basically, the skidding lines types define the technological lines types.

Schematically, the skidding lines are classified in two groups, in accordance with the basic equipment (the equipment used for forwarding):

- skidding lines having as basic equipment skyline;
- skidding lines having as basic equipment skidding tractor.

In each group are distinguished, two other sub – groups as it follow:

- fully yarding – forwarding lines with skylines or tractor;
- fragmented yarding –forwarding lines having as basic equipment skylines or skidding tractor.

Fully yarding – forwarding lines with skylines or skidding tractor are usually called unique skidding lines or directly skidding lines from stub. In case of these lines, with the same skyline or only with the skidding tractor are realized the totally wood skidding from stub till the landing area. Using this lines types, are realized a maximum technical – economical efficiency.

Fragmented skidding lines having as basic equipment skyline include a skyline which is used for forwarding, yarding being realized or with other skyline, or with other means (skidding tractors, animals a.s.o). In a similar way, the fragmented lines having as basic equipment skidding tractor, involve the usage of other equipment (skylines, animals a.s.o.) for yarding.

In accordance with the number of successive skidding operations, the fragmented skidding lines could be double, triple or multi – fragmented. As much the skidding line is fragmented, the costs are higher and the productivity is lower, as a result that many operations could repeat each other a.s.o.

The usage conditions, technical or silvo – technical, for each skidding line type, are imposed by the influences factors at the skidding lines establishing.

### **3. Skidding lines**

The placements of skidding lines are referred at the way of distribution of trails and yarding area on the stand.

In principle, the placements of skidding lines have to be realized thus that the efficiency of the logging works, as productivity and costs to be maximum as possible. Also, at the placement of skidding tracks have to be followed the principle of minimum movement distance of wood, avoiding the movement on parallel skidding tracks with the main transport road, the unjustified approaching between the skidding tracks, doubling the skidding tracks with different equipments.

The skidding lines having as basic equipment skyline are used in stands with more than 25% declivity (more than  $15^{\circ}$ ), in situations when the field does not allow the access of skidding tractor or when their usage is non – economic.

Fully yarding – forwarding lines with skyline are characteristic to the stands in which are applied clear – cut cuttings, where the lateral yarding with skylines is not embarrassed because is logged the full stand. The tracks for lateral yarding have 2m width and are oriented at  $45^{\circ}$  on uphill.

In accordance with the terrain configuration, the skyline lines are disposed parallel or in fan. The distance between these lines is specific for each skyline type, in accordance with the lateral yarding capacity (generally 40 – 50m on both side of the line).

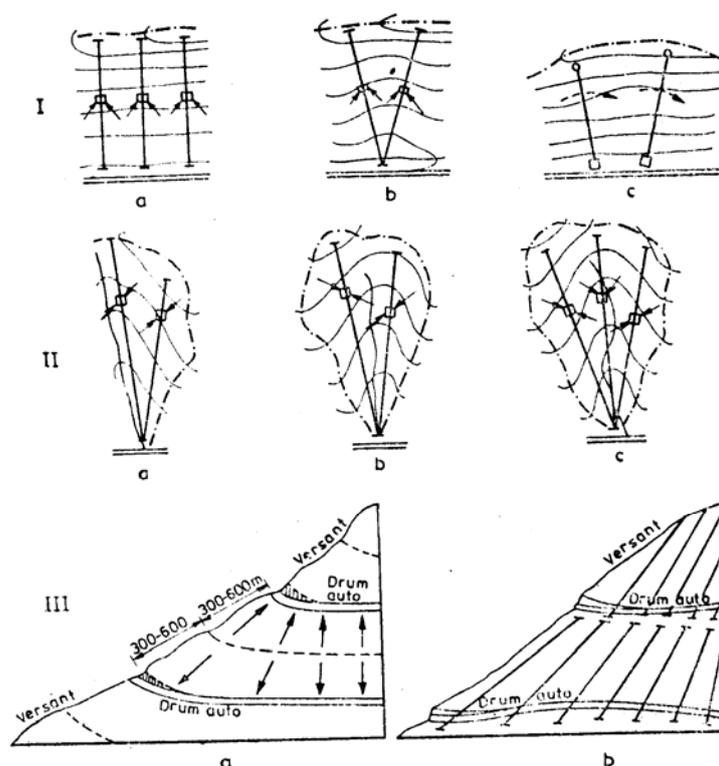


Figure 1. Scheme for fully yarding – forwarding lines with skylines

*I – on slopes having at base a transport way: a – parallel lines; b – lines disposed in fan; c – specific working way.*

*II – in basins dispose lateral regarding the transport way: a – slope of basin; b, c – basins with different width.*

*III – in the conditions of roads disposed on slopes: a – in uphill and downhill directions; b - in downhill way.*

The main placement schemes for these types of lines are presented in Figure 1. Fragmented skidding lines having as basic equipment skylines are used in the next silvo - technical and terrain conditions:

- in stands with selective cuttings, where the skyline is used only for forwarding, other equipments being used for yarding;

- in stands with clear – cut cuttings, if the skyline for forwarding is connected with an other equipment for yarding (skidding tractor or an other cableway), the fragmentation of skidding line being imposed by the terrain conditions;
- in case of stands located far each other, in which the forwarding with skyline is made on lines designed on the exterior of the stands;
- in stands in which the forwarding is made with skylines specialized for this operation.

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