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ECONOMIC COMMISSION FOR EUROPE
FOOD AND AGRICULTURE ORGANIZATION
OF THE UNITED NATIONS
INTERNATIONAL LABOUR ORGANISATION

Timber Committee
European Forestry Commission

**Joint FAO/ECE/ILO Committee on Forest Technology,
Management and Training**

**WORKSHOP ON NEW TRENDS IN WOOD HARVESTING WITH
CABLE SYSTEMS FOR SUSTAINABLE FOREST MANAGEMENT
IN THE MOUNTAINS**

Ossiach (Austria), 18-24 June 2001

**With the participation of the International
Union of Forestry Research Organizations (IUFRO)**

REPORT

INTRODUCTION (Item 1 of the agenda)

1. The Workshop on “**New Trends in Wood Harvesting with Cable Systems for Sustainable Forest Management in the Mountains**” was held from 18 to 24 June 2001 at the Forestry Training Centre in Ossiach, Austria, at the invitation of the Government of Austria and under the auspices of the Joint FAO/ECE/ILO Committee on Forest Technology, Management and Training. There were 87 registered participants from the following 26 countries: Austria, Bolivia, China, Croatia, Czech Republic, Equatorial Guinea, France, Germany, Greece, Ireland, Italy, Japan, Kenya, Republic of Korea, Morocco, Netherlands, Peru, Russian Federation, Slovakia, Slovenia, Sri Lanka, Switzerland, Turkey, UK, Ukraine and USA.

2. The participants were welcomed on behalf of the Joint FAO/ECE/ILO Committee by the past Chairman, Mr Paul N. **Efthymiou**, who opened the Workshop, on behalf of FAO by Mr Joachim **Lorbach**, on behalf of IUFRO by Mr Hans Rudolf **Heinimann**, on behalf of the Forestry Training Centre, Ossiach, by Mr Johann **Zöschner**, and on behalf of the Government of Austria by Mr Gerhard **Mannsberger**, Director General, Forestry Department.

ADOPTION OF THE AGENDA (Item 2)

3. The Provisional Agenda was adopted.

ELECTION OF OFFICERS (Item 3)

4. The following Chairpersons were elected:

Paul N. Efthymiou (Greece)	Items 1, 2 and 3
Rudolf Heinrich (Austria)	Item 4
John Garland (USA)	Item 5
Philip Owende (Ireland)	Item 5
Peter Schiess (USA)	Item 6
Rien Visser (USA)	Item 6
Hans Rudolf Heinimann (Switzerland)	Items 7 and 8
Joachim Lorbach (FAO)	Items 9 to 11

INTRODUCTION TO AUSTRIAN FORESTRY (Item 4)

5. Rudolf **Heinrich** opened Agenda Item 4. The following topics were presented:

- S** *Sustainable Forest Management as a Basis for a Steady Supply of High Quality Wood and Lumber* presented by Gerhard **Mannsberger**;
- S** *Forestry in Carinthia* presented by the President of the Forest Association of Carinthia, Christoph **Habsburg-Lothringen**;
- S** *Activities and Programmes of the Austrian Chambers of Agriculture and Forestry for Forestry in Austria* presented by Thomas **Stemberger**.

NEW DEVELOPMENTS IN CABLE SYSTEMS (Item 5):

Planning and organization of work; application of systems; productivity and costs of cable crane operations; evaluation of environmental impacts using cable systems, and post harvesting assessment.

6. John **Garland** opened Agenda Item 5. The following presentations were made:

IUFRO Programme on Global Forest Information by Heinrich **Schmutzenhofer**

Skyline Logging Systems presented by Othmar **David**

Forest Cableways in Shelterwood System presented by Premysl **Horek**

7. A guided tour of the forest equipment exhibits was made with Rudolf **Heinrich**. The following equipment was on display on the Training Centre grounds:

- \$ Wolf Systems
- \$ Maxwald
- \$ Heinz Stuefer
- \$ SEIK Zona Artigialale S. Lugano
- \$ Husqvarna-Ges.m.b.H Nfg. KG
- \$ Koller GmbH
- \$ Reinhold Hinteregger
- \$ Gantner
- \$ Franz MAYR-MELNHOF-SAURAU
- \$ Greifenberg s.n.c.
- \$ Tröstl
- \$ Konrad Forsttechnik GmbH
- \$ MZLU, SKOLNI LESNI PODNIK

8. Günter **Sonnleitner** provided a guided tour of the Forest Training Centre facilities.

9. An excursion was made to Ossiacher Tauern to see a demonstration of forest cable equipment. (See Annex 1.)

10. Philip **Owende** continued with Agenda Item 5 and the following papers were presented:

- S *Aspects of Mechanical Engineering for Cable Systems* presented by Walter **Huettnner**;
- S *Multi Criteria Evaluation of Thinning Operations in Steep Terrain* presented by Karl **Stampfer**;
- S *Optimal Line Lengths when Skidding Wood with the Syncrofalke Cable Crane in Slovenian Conditions* presented by Boštjan **Košir**;
- S *Skyline Yarding Distance Modelling for Logging in Mountains* presented by Jan **Tucek**;
- S *Time Analyses on Koller K300 Mobile Skylines in Artvin Region* presented by Tolga **Öztürk**;

- S *Structure of Cost and Performance of a Koller K300 Yarder* presented by Gerhard **Rieger**;
- S *Work Performance of Koller K300 Cable System on Difficult Terrain in Turkey* presented by Metin **Tunay**;
- S *Gantner Skyline for Timber Extraction in Turkish Forestry* presented by Mehmet **Eker**;
- S *Cable Logging Opportunities in the Eastern USA* presented by Rien **Visser**;
- S *Helicopter logging in the Slovak Republic* by Valeria **Messingerova**;
- S *Forest Machine CD-Rom* presented by Wilfried **Pröll**;
- S *Winch Uses in Work with Extra Light Cable System in Centre South of Italy* presented by Paolo **Calvani**;
- S *Timber Extraction Technologies in Croatian Mountainous Selection Forests* presented by Marijan **Susnjar**;
- S *Timber Production Is Changing - Demands and Chances in Austria* presented by Hubert **Dürrstein**;
- S *Efficiency Problems in Harvesting Small-Dimensional Wood* presented by Paul N. **Efthymiou**.

USE OF CABLE SYSTEMS FOR SUSTAINABLE FOREST MANAGEMENT (Item 6):

Requirements of roads for the use of cable systems; use of cable systems in combination with other extraction machines, and cable systems in combination with wood processors.

11. Peter Schiess opened Agenda Item 6. The following papers were presented:

- S *Production of Fuel Chips from Logging Residue at Cable Landings* by Raffaele **Spinelli**;
- S *Relation between Forest Roads and Extraction Machines in Sustainable Forest Management* presented by Tibor **Pentek**;
- S *Cable Crane Utilisation in the Close-to-Nature Silviculture in the Upper Piave River Valley (Belluno Province, Northern Italy)* presented by Raffaele **Cavalli**;
- S *Implementation of the Cable Logging Requirements in Environmentally Sound Road Construction* presented by Robert **Robek**;
- S *Characteristics of the Cable Yarding System Application in the Ukrainian Carpathians* presented by Sergiy **Zibtsev**.

12. Rien **Visser** continued with Agenda Item 6 and the following papers were presented:

- S *Current Trends in Cableway System in the UK* presented by Colin J. **Saunders**;
- S *Is There a Role for Cable Extraction on Low Gradient Sensitive Sites?* presented by Philip M. **Owende**;
- S *Road Management Strategies to Reduce Habitat Impacts - A Case for Engineered Cable Yarding Operations and Harvest Schedules* presented by Peter **Schiess**;
- S *Approaches to the Design of Forest Cable Systems* by Hans Rudolf **Heinimann**;
- S *Optimization of Cable Harvesting Equipment Placement and Road Locations Using Digital Terrain Models* presented by Woodam **Chung**;
- S *New Algorithms for Solving Large Scale Harvesting and Transportation Problems Including Environmental Constraints* presented by Woodam **Chung**;

- S Wood Harvesting and Sustainable Forest Management in Morocco* presented by Mohammed **Ellatifi**;
- S Communal Forest Management in Chiquiacá-Bolivia* presented by Gabriela **Gutiérrez Pérez**;
- S Forestry Operations in Cajamarca, Peru* presented by Luis A. **Novoa Robles**;
- S Presentation of the Austrian Federal Forests Joint Stock Company and the Millstatt Enterprise* by Günther **Tragatschnig**.

13. An excursion was made to the Austrian Federal Forests Enterprise, Millstatt, with Günther **Tragatschnig** to see a demonstration of cable machinery developed and produced by the Enterprise. (See Annex 2.)

USE OF CABLE SYSTEMS AND NORMS FOR WORK SAFETY (Item 7):

Safety and health in cable crane operations; accident prevention, training and extension in cable crane operations.

14. Hans Rudolf **Heinimann** introduced Agenda Item 7. The following papers were presented:

- S The Use of Cable Cranes in South Tyrol in the Light of Recent Legislation* presented by Claudio **Pollini**;
- S Productivity Improvement in Cable Harvesting from Human Resources* presented by John **Garland**;
- S Occupational Safety and Health of Forestry Workers of Cable Harvesting in Turkey* presented by Seca **Gandaseca**.

USE OF CONTRACTORS IN CABLE CRANE OPERATIONS (Item 8):

Business contracts; work organization; work control and post harvesting assessment

15. Hans Rudolf **Heinimann** introduced Agenda Item 8. The following papers were presented:

- S Employment of Contractors in Cable Crane Operations in Austria* presented by Hubertus **Fladl**;
- S Development of Mechanised Logging* presented by Johannes **Loschek**;
- S View of the Contractor for Forest Companies* presented by Anton **Streif**;
- S Natural Forest Protection Programme and Timber Supply and Demand in China* by Shouxin **Xie**.

OTHER MATTERS (Item 9)

16. No other matters.

CONCLUSIONS AND RECOMMENDATIONS (Item 10)

Conclusions

- a) The Workshop agreed that cable systems in combination with a suitable road network are an environmentally friendly technology supporting sustainable forest management in mountainous terrain.

Cable systems are key to extraction of wood from steep sites and other sensitive areas that are unsuitable for ground-based systems.

- b) The meeting concluded that there are a broad variety of cable harvesting technologies and systems suitable for both developed and developing countries.
- c) It was considered important that appropriate technologies and related training in cable systems should be offered to developing countries.
- d) It is important that the reported performance of cable harvesting systems is comparable. Some standardized data items are desirable.
- e) While cable harvesting may be more complex and expensive than some other harvesting systems, it is a viable solution to harvesting steep and difficult terrain as a means of sustainable forest management and social development.
- f) There is a need for more studies on newly developed cable systems in mountainous terrain. The factors to consider in these studies include: costs, productivity, soil and water, occupational health and safety.
- g) This Workshop was found interesting and useful and there should be further meetings organized on the use of cable and other harvesting and transport systems on difficult terrain conditions and low bearing capacity sites.

Recommendations

To the Joint Committee

- a) There is a continuous need for technical developments and the associated information exchange/training in the area of cable harvesting. Cooperation among scientists, managers, practitioners, contractors and workers is especially necessary for cable harvesting. There is a need to also consider low-tech extraction systems for future workshops.
- b) Support regional demonstration workshops on cable logging to introduce it to countries in transition and to developing countries. Create private-public partnerships between donor countries, suppliers of machinery and users in countries of need.
- c) More work should be done within the framework of the Joint Committee towards improvements in wood harvesting operationally combined with new developments and interactions in technology, information, employment needs, sustainability, multiple use, certification, biodiversity and land use conflicts.

To Member Countries

- a) Scarce resources and human expertise in the area of cable harvesting within individual countries make regional and international cooperation essential. Centres of excellence in cable harvesting should be identified and supported as national priorities and international agreements.
- b) Review legal provisions for harvesting on steep slopes. Restrictions for steep slope extraction may be adjusted to enable low impact harvesting technologies.

- c) Forestry administrations and services of the Member Countries should study the reform of the Austrian (ÖBF) Federal State Forests as an example of a modern, efficient and successful transformation of a state forestry administration.
- d) Since site conditions are diverse and subject to varying levels of technical, economic and social constraints, each country/region needs to define suitable options in tree harvesting and extraction.
- e) Issues of personal safety must be adequately addressed.

To Forest Research Institutes and IUFRO

- a) There appears to be a need for improved methodologies in the statistical treatments within research projects and methodologies of analysing tensions and loads of cableways. Information exchange among scientists on these topics would be mutually beneficial for the field of cable harvesting.
- b) Carry out research on cable logging for small-size timber in mountainous terrain.
- c) Forest research institutions should strengthen their research activities in designing new harvesting systems with an integrated systems approach with a holistic study of the respective production chains from the stump to the final end-use products.
- d) It is important to strengthen the networking of research groups in this area.

ADOPTION OF THE REPORT (Item 11)

- 17. The draft report, prepared by the Secretariat, and the conclusions and recommendations were adopted.
- 18. For the host country, Rudolf Heinrich thanked the participants for attending the Workshop, preparing papers and posters, for the lively discussions during the different sessions and for the conclusions and recommendations. Finally, Paul N. Efthymiou, on behalf of the Joint Committee, and Joachim Lorbach, on behalf of FAO, thanked the participants, the host country and all support staff for their active contribution to the successful outcome of the seminar. Participants were presented with Certificates of Attendance.
- 19. An excursion was made to the Bistum Gurk Forest Enterprise with Joachim Gfreiner who made a presentation on the use of tracked harvester and cable systems. (See Annex 3.)
- 20. A final excursion was made to Klagenfurt and Hochosterwitz Castle.

Annex 1

Excursion in the afternoon of the 19th of June 2001 to the Forest District Ossiacher Tauern of the Forest Enterprise Millstatt Austrian Federal Forests Joint-Stock Company (ÖBF AG) Experimental and Training Forest Area of the FFTC-Ossiach

Short walk through the stand to:

Excursion point 1	Sledge winch Gantner HSW 80 , gravity system uphill, assortment method Carriage Stuefer HSK 2002 Skyline tensioning device Seik with integrated dynamometer
Excursion point 2	Mature tree directional felling, delimbing and bucking with chainsaw, extraction by agricultural tractor Steyr 9094 Forst with radio controlled attachable winch Hauselberger Tiger DSU/WH 80 V
Excursion point 3	Thinning operation, felling, delimbing and bucking with chainsaw, extraction by wheeled skidder Iwafuji T 30
Excursion point 4	Downhill extraction with Konrad Forsttechnik Woodliner (mono cable system), assortment method in a selective cut
Excursion point 5	Uphill extraction with Koller K 300 , gravity system, carriage Koller SKA 1 Z assortment method in a selective cut
Excursion point 6	Uphill extraction with Larix 3 T , carriage KOS , running mainline all-terrain system, assortment method in a selective cut
Excursion point 7	Uphill extraction with Konrad Forsttechnik Mounty 4000 , gravity system, carriage Mayr-Melnhof Sherpa-Mot , full tree method Woody 50 processing head on hydraulic knuckle boom loader
Excursion point 8	Uphill extraction with Koller K 501 , gravity system, carriage Koller MSK 3 , assortment method, hydraulic knuckle boom loader to manipulate logs (trees) at the landing

Excursion to Ossiacher Tauern

Silvicultural data from the forest management plan 1994 – 2003

Excursion point 1, 2 and 4: Sub-compartment 121 b 1

Production forest, rotation 100 years, exposition N, average slope 25°, altitude 800 m, brown soil on silicate bedrock with rich nutrient content and fresh, vegetation type SF, total area of stand 3,6 ha, age 95 years (100% spruce yield class 14), density 09, 769 m³ standing volume / ha.

Silvicultural measures: on 3,5 ha selective cut with small clearings to enhance natural regeneration, expected volume 450 m³, whole stem method with wheeled skidder.

Excursion point 3: Sub-compartment 121 b 2

Production forest, rotation 100 years, exposition N, average slope 25°, altitude 800 m, brown soil on silicate bedrock with rich nutrient content and fresh, vegetation type SV, total area of stand 2,1 ha, age 20 years (90% spruce yield class 14, 10% larch yield class 8), density 10, at present approx. 170 m³ standing volume / ha.

Silvicultural measures: None, thinning initiated for demonstration only, will be thinned during next 10 year period.

Excursion point 5, (1), 6: Sub-compartment 121 g 1

Production forest, rotation 100 years, exposition N, average slope 25°, altitude 700 m, brown soil on silicate bedrock with rich nutrient content and fresh, vegetation type SF, total area of stand 14,9 ha, age 75 years (100% spruce yield class 13), density 09, 591 m³ standing volume / ha.

Silvicultural measures: on 7,0 ha secondary thinning, with small clearings to enhance natural regeneration, expected volume 500 m³, full tree method with skyline.

Excursion point 7, 8: Sub-compartment 120 e

Production forest, rotation 100 years, exposition N, average slope 25°, altitude 700 m, brown soil on silicate bedrock with rich nutrient content and fresh, vegetation type SF, total area of stand 10,4 ha, age 70 years (100% spruce yield class 13), density 09, 550 m³ standing volume / ha.

Silvicultural measures: on 6,0 ha secondary thinning (was done at the beginning of this management period), expected volume 400 m³, assortment method with wheeled skidder / tractor and southern part with skyline.

Forestry technique of the Austrian Federal Forests Joint Stock Company

1. General Information

The companies of forestry technique of the ÖBfAG are operating in:

- S Timber harvesting;
- S Forest road construction and maintenance;
- S Dike construction; and
- S Special repairs of heavy machinery.

At present three forest technique companies are run as profit centres:

- S Hütteldorf (near Vienna);
- S Steinkogl (in Upper Austria); and
- S St. Johann i. Pg. (in Salzburg).

Out of the 230 employees:

- S 110 work in timber harvesting,
- S 75 in forest road construction;
- S 25 in the mechanical work shops; and
- S 20 in the administration.

The annual productivity of the three companies averages:

- S 700.000 m³ in timber harvest (90% intern, 10 % extern);
- S 60 km of road construction (80 % intern, 20 % extern);
- S 250 km of road maintenance (80 % intern, 20 % extern).

2. Forestry Technique Company St. Johann

With about 100 employees, it is the largest forest contractor for harvesting and forest road construction in the region of Salzburg, Tirol, Carinthia, Vorarlberg and Bavaria. Together with our other two companies in Steinkogl and Hütteldorf, they represent by far the largest enterprise of this kind in Austria and the neighbouring countries.

In cooperation, these three companies can even manage unpredictable tasks, as they repeatedly occur in nature, fast and efficiently, as demonstrated after hurricane „Lothar“ in the year 2000 in Switzerland with a salvaged timber volume of 70,000 m³.

2.1. Timber Harvesting

The annual volume of timber harvested by the St. Johann company is around 250,000 m³, of which around 200,000 m³ are harvested within the ÖBfAG, and 50,000 m³ for third parties. Approx. 50 % is cable logging, and 50 % is logged with skidders.

Machinery Available:

- S 14 Cable systems
- S 21 Wheeled skidders
- S 5 Roadside processing machines
- S 1 Walking harvester

2.2 Forest Road Construction and Maintenance

Approx. 40 km of new forest roads are constructed every year. The annual maintenance and repair of forest roads is 140 km on average.

Available Machinery:

- S 5 Tracked excavators
- Wheeled excavators
- S 1 Walking excavator
- S 4 Tracked front end loader
- S 4 Wheeled front end loaders
- S 4 Angle dozers
- S 10 Trucks
- S 5 Drilling machines
- S 4 Graders
- S 4 Vibration compactors
- S 1 Flatbed truck

Our employees have years of experience in logging and forest road construction and maintenance. They are well trained and receive further training at the internationally recognized forestry training centres in Austria. They work with modern machinery and will gladly inform you about the company's varied services.

Annex 2

Excursion in the afternoon of the 21st of June 2001 to the Austrian Federal Forests Joint-Stock Company (ÖBf AG) Forest Enterprise Millstatt - Forest District Gerlitze - Hütten

Logging operation with tower yarders and processing unit in mountainous forest

- Excursion point 1** Tower-yarder with processing head **PKM 6** working in a selective cut to favour regeneration, full tree method, felling by chainsaw, uphill extraction, delimbing and bucking with processing unit.
Short downhill walk on the road to forest sub-compartment 146 q.
- Excursion point 2** Tower-yarder with processing head **PKM 10** thinning and selective cut to favour regeneration, full tree method, felling by chainsaw, uphill extraction, delimbing and bucking with processing unit.

The harvesting activities are carried out with equipment and staff of the **Forsttechnik St.Johann der ÖBf AG** (one of three forest harvesting and road construction enterprises within the ÖBf AG) who operates several tower yarders, 21 wheeled skidders, processors, harvesters and forwarders as well as equipment for forest road construction and maintenance. They are the most important forest contractor in the region of Carinthia - Salzburg - Tirol and southern Bavaria.

Silvicultural and technical data

Excursion point 1:

Sub-compartment 146 n 1 – data from the forest management plan 1994 - 2003

Production forest, rotation 140 years, exposition NW, average slope 30°, altitude 1500 m, soil on silicate bedrock with moderate nutrient content and moderately fresh, vegetation type AHD, total area of stand 2,0 ha, 80% of age 130 years (80% spruce yield class 6 and 20% larch yield class 7), 20% of age 70 years (100% spruce class 6), density 09, 395 m³ standing volume / ha.

Silvicultural measures: on 1,5 ha selective cleaning (negative selection) and takeout of upper canopy over existing regeneration, enhance natural regeneration, expected volume 250 m³, assortment method with skyline. On 0,5 ha clear felling with previous selective cleaning cut and wounding of soil to favour natural regeneration, expected volume 300 m³, full tree method with skyline (measure needs additional permission from the forest authority).

Equipment used: PKM 6 tower yarder with processing unit Steinkogl KP 50

Manufactured by **ÖBF Bau- und Maschinenhof** for uphill yarding in gravity system with slack pulling of mainline by auxiliary line. Mounted on a 2-axle truck with 240 hp engine. Fully equipped weight of the unit is 18 tons. The 3-drum winch aggregate is driven by hydraulic motors. Tubular mast of 8 m height with 2 main anchor ropes, attachable landing platform usable on either side of the carrier. Mounted on the rear end is a hydraulic knuckle boom loader **Penz 13000** with the **KP 50 processing head**. Skyline 600 m / 18 mm, mainline 700 m / 11 mm compacted, auxiliary line 700 m / 6,5 mm, carriage **ÖBF type U 2** with time controlled clamping device and 2 ton capacity. Radio controlled mainline drum permits continuous yarding while processing as the feller / choker setter commands the movements of the carriage.

Range of use is from secondary thinning (AMD >16 cm) to final harvesting in full tree or tree part

method. Set up time with 2 workers 4 – 10 hours, depending on length of installation and number of constructions. Productivity 4 – 7 m³/ hour depending on tree size and yarding distance. Continuous removal of processed logs is required.

Excursion point 2:

Sub-compartment 146 q 1 – data from the forest management plan 1994 - 2003

Protection forest, rotation 120 years, exposition SE, average slope 30°, altitude 1300 m, soil on silicate bedrock with moderate nutrient content and moderately fresh, vegetation type SF, total area of stand 1,5 ha, age 130 years (90% spruce yield class 8 and 10% larch), density 09, 527 m³ standing volume / ha, grade of canopy cover 9, stand stability moderate.

Silvicultural measures: on 1,2 ha selective opening with small group felling (femel) to initiate and favour natural regeneration, expected volume 200 m³, assortment method with skyline (measure needs additional permission from the forest authority).

The cable corridor traverses also **146 q 3**, a stand 40 years old where a thinning (approx. 30 % of the standing volume) is prescribed, and reaches down into **146 q 2**, a stand 100 years old which was not to be worked during this management period, but because of the present work will be utilized partly in form of selective opening (protection forest).

Equipment used: PKM 10 (prototype) tower yarder with processing unit Strenab 60

Manufactured by **ÖBF Bau- und Maschinenhof** for uphill yarding in gravity system with slack pulling of mainline by auxiliary line. Mounted on a wheeled excavator **Liebherr 922**. The excavators bucket arm was modified to a telescopic boom (jib) carrying the **Strenab 60 processing head**. Fully equipped weight of the unit is 30 tons. All drives are powered by hydraulic motors. 3-drum winch aggregate, tubular mast of 12 m height with 6 main anchor ropes. Strong trees are needed for supports and anchoring (also other anchor types) to withstand the heavy strains originating from this large piece of equipment. Skyline 800 m / 24 mm, mainline 1.000 m / 14 mm compacted, auxiliary line 1.100 m / 8 mm, carriage **ÖBF type U 5** with time controlled clamping devise and 5 ton capacity.

Used for uphill yarding in final cut full tree or tree part method. Good forest roads with compacted surface are needed to support this heavy type of equipment as well as adequately dimensioned bridges.

Set up time with 2 workers 10 - 15 hours, depending on length of installation and number of constructions. Productivity 7 – 10 m³/ hour depending on tree size and yarding distance. Continuous removal of processed logs is required.

General Information on the Forest District Ossiacher Tauern of the Forest Enterprise Millstatt Austrian Federal Forests Joint-Stock Company (ÖBf AG) Experimental and Training Forest Area of the FFTC-Ossiach

The experimental and training forest area of the Federal Forestry Training Centre (FFTC) Ossiach comprises the forest compartments 107 to 125 of the forest enterprise Millstatt – ÖBf AG. The total area is **606,3 ha** of which 574,5 ha is forest land (excluding roads etc.). It is situated at the northern slope of the mountain “Ossiacher Tauern” at an elevation of 500 m – 1.000 m above sea level. During the summer it is heavily frequented by tourists and throughout the year by inhabitants of nearby towns. The recreational function of this forest area is an important factor besides the welfare and productive function. The annual cut varies from 4000 m³ to 5.000 m³ which is less than the annual increment.

The woodland community is Luzulo-Abieti-Fagentum on acid soils. More broadleaf in medium and lower elevation, conifer dominated in upper region, Larix-variants on steep slopes and Primus on drier ridges. Climatic conditions are moderate sub-continental with well distributed moderate precipitation of 1.000 – 1.100 mm per year. Average medium annual temperature 7 – 8 ° C. Wet snow area.

Growth district is marginal alpine spruce-fir-beech-forest of lower and medium montane level. Moderately steep to steep northerly slopes with flat areas in the upper region. Bedrock is mainly crystalline slate and mica-slate with a few limestone and marble bands. Mostly deep soils, of which 77 % are fresh nutrient rich brown soils, on upper slopes often with podzolic dynamic.

Vegetation type is mainly wood-sorrel (*Oxalis*) and lily of the valley (*Maianthemum bifolium*) which facilitates natural regeneration. Vegetation regrowth on clear felled areas enhances bio-diversity and provides food for game animals.

Distribution of tree species:	spruce	65 %
	beech	30 %
	fir	5 %
	with some larch and pine	
Productivity of stands:	On the slopes – specially the lower slope high growth performance	
	Spruce and fir	mean annual increment 100 = 10 – 14 (16)
	Beech	mean annual increment 100 = 7 - 9
Roads and Harvesting:	Forest road density is > 50 longitudinal meters / ha.	
	About 35 % of the forest area permits logging with wheeled skidders	
	(< 35 % slope) or with harvester and forwarder.	
	35 % of the forest area demands cable logging, the rest lies in between and is logged mainly with cable systems.	

The forest is tended and utilised according to the management plan of the ÖBf AG considering the training and experimental needs of the course activities from the FFTC. The produced timber belongs to the forest enterprise Millstatt but harvesting costs for each m³ of logs produced are partly refunded to the FFTC.

Annex 3

Excursion in the afternoon of the 22nd of June 2001 to the Forest District Straßburg of the “Bistum Gurk” Forest Enterprise and the Gurk Monastery Logging operation with harvester and cable systems in mountainous forest

- Excursion point 1** Contractor **Profiteam Holzer** with **Harvester Valmet 911 Snake**
Contractor **Fa. Klade Holz** with **Mayr-Melnhof tower yarder Syncrofalke**
Assortment method, uphill extraction.
- Excursion point 2** **Mayr-Melnhof forest enterprise** with **tower yarder Syncrofalke, V-crane 2488**
with processing head **Woody 60**, whole tree method, felling by chainsaw,
downhill extraction, delimbing and bucking with processing unit.
MEMO FORCE 2000, a measuring device for wire rope tension developed
by **DI Dr. Heinrich Paar**, on behalf of the General Accident Insurance (AUVA),
represented by **DI Hannes Rothlauer**, Accident Prevention Service

Excursion to the forest districts of the Bistum Gurk

1) Historical data on the enterprise „Bistum Gurk“:

Around the year 1043, after the death of her husband William and their son, the Countess Hemma of Zeltschach founded a monastery in Gurk. After this monastery had been closed 30 years later, the possession was transferred to the archbishop of Salzburg, Gebhard, who donated this possession for the establishment of the Diocese Gurk. The respective bishop of Gurk-Klagenfurt has been trustee of this possession since that time.

The operation Bistum Gurk is a legal entity. The yields are appropriated to the establishment and preservation of church buildings, for social and cultural purposes in the Diocese Gurk and the financing of the bishop's residence in Klagenfurt.

The Bistum Gurk consists of several enterprises, the main operations of which are bound to the property of lands. These are: forestry, the hunting and fishing connected to it, as well as the lease of agricultural areas. Further branches of the enterprise are 2 small hydroelectric power plants and the bio-energy long-distance heating plants in Friesach and St.Georgen.

The Bistum Gurk also manages the Catholic Educational Institute of St.Georgen, and it is responsible for the upkeep of two castles: Pöckstein and Straßburg.

2) Structure of the managed land property:

Area of the whole enterprise in ha.:

Area in ha	total
Production forest	7.608,6
Protection forest in use	848,2
Protection forest without use	1.305,4

Total forest land	9762,1
Alps und unproductive areas	1675,4
Agricultural areas	835,5
Water surface	22,2
Total non-forest land	2.533,0
Total area	12295,2
Thereof in Carinthia	9.799,1
in Styria	2.496,1

3. The present situation of the enterprise:

Due to economic conditions and the past development of the enterprise, it became necessary to reduce the enterprise to its original operations and to modify its structure. These were in particular:

The sale of the forest enterprise's sawmill in the year 1999. The sawmill with a primary conversion of approximately 20,000 solid cubic meters per year could not be run with a positive economic return any longer.

The agriculture which had been part of the enterprise until 1998, had to be leased out for economic reasons, too.

In the year 1994, the small carpentry of the enterprise „BIGU“ was turned into a medium industrial company with 25 workers. The basic idea was to improve secondary conversion of timber to the final product within the enterprise. Everything should be done in our own enterprise: harvesting the timber in the forest, sawing in our own sawmill, and the production of furniture in our own carpentry. When realizing this idea, market conditions were not considered sufficiently, so at the end of the year 2000, the carpentry had to be merged with a door manufacturer.

4. Felling quantity 2000:

After a sample inventory had been taken in the year 1999, the annual cutting rate for the Bistum Gurk was set at 32.850 cubic meters round wood.

The total harvest for the year 2000 was 31,987 cubic meters of timber, 4% of which was damaged through natural causes (e. g. wind blow). 55% of the harvest came from final cuts of mature stands and 45 % from thinnings. The average MD (Media) was 18,1 cm.

There are two main reasons for the high percentage of harvesting in premature stands: First of all, it was necessary to reduce the backlog of thinnings (selective logging) that had been neglected in the years before, and which was very urgent, especially in primary thinnings. The second reason was the situation of the timber market, where a notable price recession for big size timber had taken place.

The costs of felling and transportation were relatively high and amounted to ATS 365,-- per solid meter, as a result of the low Media of 18,1 cm. The high proportion of cultivating steps (measures) resulted in wood assortments of a low value, and so the average returns from timber sale were ATS 737,-- per solid cubic meter leaving only a low margin (reimbursement) of ATS 365,--.

5. Characteristic value (Forest survey 1999):

Yield class	7,1
Stand density	0,84
Current annual increment	7,5
Stocking volume/ha	268
Age	82
Average slope	38
Bark peeling damage by deer	3,3
Logging damage	4,8
Shaft quality	
A	4%
B	69%
C	23%
Firewood	2%

6. Timber Harvest 1995 - 2000

Cubic meters	1995	1996	1997	1998	1999	2000
With company employees	33101,02	28243,86	32029,87	26.142,00	10854,62	8752,04
Sold as stocking volume	3258,46	7821,35	2335,43	4159	851,82	541,68
Contractors	4845,12	5855,16	3923,10	4130	12631,28	22693,00
Total m³	41.204,60	41.920,37	38.288,40	34.431,00	24.337,72	31.986,72
in Percent						
With company employees	80,33	67,38	83,65	75,93	44,60	27,36
Sold as stocking volume	7,91	18,66	6,10	12,08	3,50	1,69
Contractors	11,76	13,97	10,25	12,00	51,90	70,95
Total	100,00	100,00	100,00	100,00	100,00	100,00

This table clearly shows that the share of contract felling has risen from 10% to 70% within 3 years because of the high costs of felling by our own workers, which has decreased accordingly to improve the economic return. However, the employment policy of our enterprise will stay the same for the future. We are not considering a dismissal of our employees for timber harvesting at the moment.

7. Educational Institution at St. Georgen

The excursion ends at the Educational Institution St. Georgen which was acquired by the Bistum Gurk in the year 1959. This institution comprises an area of about 17.000 m². Its primary obligation is to Catholic education. Annexed to it is a seminar hotel of high standard.

The Catholic church is also obligated to support culture and further education, so until 2 years ago 3 schools were run in this institution (a school of domestic science and an agricultural school in addition to

the present institute). For economic reasons it became necessary to close these schools. The organization of the Education Institution has to be restructured to increase utilization to full capacity and to reduce costs. This could be achieved by intensifying the offer of visiting lecturers (courses) and to find new fields of training, e.g sustainability and health care.

Silvicultural and technical information on the excursion site

Stand 1: sub-compartment 14/2

contractor Holzer with harvester Valmet 911 snake
contractor Klade with tower yarder Syncrofalke
uphill extraction, assortment method

description of the stand

alpine spruce-fir forest
towards NO moderately steep, upper Collin, quartz-mica-slate, red heart rot

age	104 years
yield class	9,75
stand density	0,64
stocking volume/ha	463,47 m ³
volume to take out/ha	77,19 m ³
average slope	55%
distribution of species	9 spruce 1 larch
natural regeneration	spruce, larch, fir, broadleaved trees
height of regeneration	20 to40 cm
vegetation type	AHD

Stand 2: sub-compartment 21/11

Mayr-Melnhof forestry enterprise, tower yarder Syncrofalke with processing head,
downhill logging, full tree method

dynamometer

MEMO FORCE

description of stand

Intermediate alpine spruce-fir forest (eastern and southern growth district)
towards N moderately steep to steep, upper Collin, mica-slate

age	78 years
yield class	10,2
stand density	0,81
stocking volume/ha	477,7 m ³
volume to take out/ha	64,3 m ³
Average slope	40%
distribution of species	10 Spruce
natural regeneration	Spruce, broadleaved trees
height of regeneration	20 to 40 cm
vegetation type	SS
