

CCFG - Timber Harvesting Workshop with Professor Hanns Höfle

‘Bringing regularity to irregular silviculture’

12th–13th May 2010, Stourton, Wiltshire

by Duncan Ireland

Introduction

Professor Hanns Höfle accepted the CCFG’s invitation to share his timber harvesting experience during this well-attended event at Stourton, Wiltshire. This was an opportunity to learn about German harvesting experience in CCF and was complemented by a series of field visits. The meeting provided an opportunity to see timber harvesting principles applied in GB contexts, balanced with the challenging objectives of CCF in the private sector. One of Professor Höfle’s central themes was the necessity for permanent, regularly spaced access racks with the primary objective of minimising ground compaction. So how easily does German harvesting practice translate to British conditions?



*Regularly spaced racks at Fontmell Hill Estate
– a central theme of the workshop’s recommendations*

Ground Compaction and the Benefit of Regular Extraction Racks

Although research into the impacts of soil compaction is ongoing, Germanic experience suggests compaction begins from the first machine pass and the cumulative effects may take decades to recover. The consequences of compaction are considered to be a reduction of oxygen and water and consequent decline in the productive function of the soil. Although research to quantify the effects is ongoing, an absence of soil oxygen and water can create anaerobic conditions, changing the balance of soil micro-organisms, increasing CO₂ production and negatively affecting soil mineralisation.

Effects of compaction on the crop may include reduced growth, increased susceptibility to fungal attack, and instability of rackside trees, particularly shallow rooting species. In Germany a policy of preventing compaction has been adopted until the outcomes of ongoing research are known. This policy has led to legislation requiring all extraction racks to be a minimum 20 m centre to centre distance. Professor Höfle

gave recommendations on rack specifications, based on German experience:

- Minimum 20 m centre to centre spacing – minimising compaction, and unproductive area.
- Straight and parallel (as terrain allows), to prevent localised point loading of the soil through machine manoeuvring.
- Rack layout should be perpendicular to roads and therefore as short as possible.
- If straight racks are undesirable e.g. in recreation areas, they can be curved at their ends where they meet the forest road.
- Racks should be marked to aid operators.
- Old rack locations should be incorporated into new networks.
- Racks should only be diverted from straight (e.g. around valuable trees) as a last resort.
- Brash on racks should be as thick as possible

Throughout the Professor's presentations important differences between German and GB forestry emerged. Mention was made of Germany's *oversupply* of well-equipped forestry contractors! An interesting opportunity would be to investigate if labour surpluses in Germany could be used in Britain? Further differences included resources, machinery options, harvesting skills and markets. Despite clear differences important messages were transferable to GB; the benefits of incentive/penalty schemes to encourage contractors to stick to designated racks, and the need to compensate contractors fairly and move them to alternative sites if work is disrupted by bad weather, which could cause ground conditions to deteriorate.

Harvesting methods appropriate for Germany's 20 m minimum rack spacing, allow felling out-with the reach of conventional harvesting machinery. These include motor manual felling to the rack and subsequent mechanised processing, pre-skidding and the use of large-scale harvesters. Larger harvesters with increased reach are also able to lift the tree and process into the rack, minimising damage to regeneration. We may consider ourselves fortunate that British forestry is not subject to rack spacing restrictions, and many of the resulting management challenges do not therefore apply.

Professor Höfle described three levels of soil compaction; elastic deformation (ruts <10 cm), plastic deformation (ruts c. 10 cm) and viscoplastic deformation (ruts >10 cm). These general principles were of interest to GB practitioners, however, different GB soils and climate mean that different levels of surface deformation may be appropriate. Particularly pertinent advice from Professor Höfle was the need to inspect the stand, consider the ground vegetation and micro-relief of the ground form, planning rack distribution at the largest scale possible.

Operational Harvesting Systems Guidance:

- The lowest input methods (and therefore the cheapest) are favourable.
- Limit ground damage to racks (confining machine movement to racks alone).
- Confine stand damage to non-future crop trees to minimise damage on the future crop.
- Contractors need to be educated in the reasons for harvesting techniques, e.g. directional felling, and need to be appropriately paid for the specialist skills they offer.
- Motor manual felling provides access advantages, but increases potential for damage to regeneration and standing trees compared to mechanised felling.
- German experience shows combined harvester, forwarder and motor manual harvesting can operate with 40m rack spacing, but at c. 70% increase in cost.
- Technical innovation offers potential for innovative harvesting systems, e.g. cross-cutting forwarder heads for processing motor manually felled whole-poles, prior to extraction.

Field Visits:

Professor Höfle's experience was complemented by a series of field visits to Fontmell Hill, Stourhead and Melbury estates.

Fontmell Hill Estate: Comprising 165 hectares of woodland characterised by intimate mixtures of beech, sycamore, ash and oak (some with an element of mixed conifer). An adaptive management approach has been implemented, tailoring management to the regeneration response to increasing light levels through thinning. The benefits of good quality harvesting contractors were emphasised in minimising harvesting damage using motor manual and skidder extraction. A discussion resulted with the estate owner Sir John



Beech at Fontmell Estate

Eliot Gardiner over the benefits of a regular, permanent rack network and the resulting conflict with the objective to minimise loss of high value trees in the process of instating straight racks.

This visit allowed the group to discuss the merits of Professor Höfle's advice in the context of GB site and crop conditions, coupled with the specific challenges of accommodating owner objectives and low timber prices. Appropriate payment to source skilled contractors for challenging work is difficult, given the difficulties in marketing Beech reported at Fontmell Hill estate. This reinforced the benefit of maintaining a versatile mixture of species and products, as a primary strength of CCF to provide diverse income sources in the future.

Stourhead (Western) Estate: Planted in the mid 18th century, as broadleaf with conifer nurses. The main objective for the estate since the 19th century has been to maintain the tree cover, preserving the landscape benefit of the estate.

Visitors were shown the irregular silviculture adopted since the 1980's; specifically 'Dropping Gutter', an area of premium quality, large dimension Douglas fir (fully described in Poore and Kerr (2009)). The silvicultural prescription for which is a transformation to permanently irregular mixed size-class structure within the life-cycle of the existing trees. There have been significant benefits from adopting a clear operational approach to management, safeguarding management continuity, and from supporting local contractors with appropriate work programmes and pay to foster the expertise to carry out harvesting of large trees. The visit also included 'Castle Wood'; recently thinned to impose a regular (20m centre to centre) rack network, incorporating historic machine tracks and targeting western hemlock for removal. Experience had shown that a wider rack spacing could have been used, given the potential to fell mature conifers toward the racks.

Melbury Estate: An opportunity to see CCF principles applied in predominantly broadleaf woodlands (largely oak with ash, sycamore, and beech). A challenging combination of management objectives combining conservation value, sporting interests and hardwood timber production favouring adoption of irregular silvicultural principles (with 92.5% of stands currently undergoing transformation). Of particular note were the challenges of regenerating oak by manipulating hazel understorey and stand differentiation



Mixed broadleaf stand differentiation at Melbury Estate

achieved through differential growth rates of ash/sycamore mixtures.

In summary the field visits illustrated the applicability of Professor Höfle's experience to British forestry. As is often the case when observing continental management experience there is value to be gained, provided managers take account of the different constraints between GB and continental forestry and use compatible techniques, with practical interventions to meet clearly defined management objectives.

Conclusions

- Installing regular access racks in CCF, brings management benefits, can reduce the effects of soil compaction and minimise loss of productive area. Appropriate rack spacing in a GB context should be assessed on a stand-by-stand basis, and linked to the harvesting system.
- Markets are crucial to the economics of forest management. Mixed species stands allow the greatest flexibility for future marketing, though species choice has to be balanced with wider management objectives.
- *Adaptation* of German harvesting practices, rather than wholesale adoption, combined with appropriate research and stand monitoring can yield the greatest benefit for transferring continental harvesting experience to Britain.

References

Poore, A. and Kerr, G. (2009) Continuous Cover Silviculture at the Stourhead (Western) Estate, Wiltshire, UK. *Quarterly Journal of Forestry*, 103:23-30.

Copies of Professor Höfle's presentations can be viewed or downloaded from the CCFG website:
http://www.ccfg.org.uk/conferences/harvesting_2010

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