

THE DEVELOPMENT OF DOUBLE DRUM WINCHES ON  
SKIDDERS IN THINNING

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INTRODUCTION

In 1982, N.Z. Forest Products started production thinning in Lake Taupo Forest and my contract logging operation (based on a 664 Clark Ranger skidder) was transferred there from Atiamuri. Lake Taupo Forest is flat to rolling country leased off the Ngati Tu Wharetoa Maori tribe by the N.Z. Forest Service who established the forest and administer the silvicultural treatment of the trees. N.Z. Forest Products negotiated a stumpage sale of the wood and are now production thinning the 10 year old stands for pulpwood. Shortly after starting in Lake Taupo, the company and I were investigating ways of increasing the payload of the skidder which had a single drum winch fitted at the time. We found that increasing the number of strops on the mainrope to eight or nine caused excessive tangling problems, and the machine had difficulty accumulating that many logs under the fairlead.

With the relatively light final crop stocking (200 stems/ha) it was possible to use a seventh row outrow system to thin the stands, but a single drum winch in that situation was not particularly efficient because breaking out wood from either side of the outrow caused excessive wear to the winchrope and resulted in high residual crop damage. We decided that it was too time consuming and not really practical to try and extract one side at a time, so after reading a LIRA report on Double Drum Winches in Thinnings (ref 1), a decision was made to try one out.

THE TRIAL

With the assistance of Moller Johnson (New Plymouth), N.Z. Forest Products and J. Gaskin from LIRA, a trial was set up using a Holder A60 tractor fitted with a modified Igland 3000 winch (ref 2). As the trial proceeded we very quickly recognised the need for well planned and executed felling and delimiting, and consequently a system was developed (ref 3). This extraction oriented felling (better known as organised felling) had a significant effect on the performance of the machine.

### FITTING DOUBLE DRUM WINCHES TO EXISTING SKIDDERS

As a direct result of these trials, I had an Iglund 5000/2H fitted to my Clark Ranger skidder in place of the existing single drum winch (ref 4). The conversion was done by Lakeland Steel in Rotorua at a cost of \$13,000.00. This included the drop box for the winch drive, the mounting of the winch and the fabrication of a double fairlead. The modification worked extremely well and production jumped by about 25%, but I had to add an extra faller to the gang to balance the man/machine ratio. The biggest problem with the modification was that the hydraulic pump was incorrectly fitted.

I increased my operation to two crews in 1984 with another 664B Clark Ranger which was immediately fitted with a double drum winch. As with the earlier conversion, crew size had to be increased to five (four fallers and one machine operator) to balance the operation.

### REPLACING WITH FACTORY FITTED DOUBLE DRUM UNITS

In 1984 I replaced my original 664B skidder with a purpose built 225A Timberjack skidder. One year later the second 664 was also replaced with a 225A Timberjack and the move to factory fitted double drums has certainly proven to be a sound one. The main advantages offered by the 225A's are the increased line pull in the winches (9080 kg as opposed to 5000 kg); and the lower maintenance requirements of the newer skidders. This extra line pull, ~~even with the slightly lower engine power~~, makes the 225A more suited to logging larger wood if the need arises.

We currently run 28 m of 19 mm winchrope on each drum and have six 1.8 m long 8 mm Kito chain strops on each rope (ref 5). The chains have turned out to be far superior to wire rope strops in our situation. In one trial we did, with chain strops on one drum and wire rope strops on the other, the chains lasted at least four times the life of wire rope, and I think we still have some of the original chains left from the trial in 1982.

### ADVANTAGES OF DOUBLE DRUMS

The main advantages offered by the double drum winches are :

1. The facility to breakout in two different directions.
2. The increased payload of the skidder through -
  - (i) Spreading the accumulation of logs across the whole butt plate;
  - (ii) Reducing the number of strops on the winchrope, i.e. six per side as opposed to eight or nine on the one winchrope with a single drum unit.
3. Being able to stagger the location of drags dropped on the landing (this makes them much easier to unstrop).

4. Reduced strop tangling when travelling empty.
5. They are particularly advantageous in lowly stocked areas where accumulating an economic drag with a single drum is difficult.

Obviously all the above factors contribute to the biggest advantage, which is higher production out of a machine with the same power.

#### DISADVANTAGES OF DOUBLE DRUM WINCHES

The disadvantages I have identified since operating double drum units have been :

1. Sensitivity to manpower fluctuations, i.e. one man away in the crew can have a significant effect on production.
2. A noticeable reduction in performance advantages as piece size increases.

#### PERFORMANCE COMPARISONS

At present one crew is working in wood with a piece size of .30 m<sup>3</sup> and are currently achieving approximately 70 tonnes per day. The stand is stacked at 1000 stems/ha and is being reduced to 200 in a random selection thinning. The other crew is producing just over 90 tonnes per day in a piece size of .61 m<sup>3</sup> and being taken from 600 stems/ha to 200 stems/ha. Once again the thinning selection is random. Generally we try to aim for a butt pull of the logs and as our tallies suggest, we can still utilise the double drums effectively.

The daily cost of the double drum unit is approximately 20% greater than a similar single drum unit (this includes the cost of the additional winch, ropes and strops, plus the cost of one extra faller in the crew). Overall, however, with the increase in production the cost per tonne is about 16% lower in small timber, see fig. 1.

Figure 1 : Productivity and Cost Comparison of a Double Drum Winch Against a Single Drum Winch Skidder

<u>Piece Size</u>	<u>Increase in Production</u>	<u>Decrease in Costs/m<sup>3</sup></u>
.10 m <sup>3</sup>	38%	16%
.15 m <sup>3</sup>	38%	16%
.20 m <sup>3</sup>	34%	12%
.25 m <sup>3</sup>	34%	12%
.30 m <sup>3</sup>	34%	12%
.35 m <sup>3</sup>	32%	10%
.40 m <sup>3</sup>	31%	9%

You can see clearly from Figure 1 that as the piece size increases, the advantages of having a double drum winch are not as great.

### DISCUSSION

In my operation Double Drum Winches have proven to be very effective in increasing the payloads of 64 kw skidders. However it must be remembered that we have a unique situation in Lake Taupo Forest because the stands are being so heavily thinned (down to ~~300~~ stems/ha). The productivity increases and reductions in cost may not be quite so distinctive in areas being thinned under different regimes. Forest Products now have 23 contractors using double drum winches in their production thinning operations which suggests that they are more than happy with the results.

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- Ref 1. Wells, G.C. "Double-Drum Winches in Thinnings", LIRA Report, Vol. 6, No. 1, 1981.
- Ref 2. Gaskin, J.E.; Gleason, A.P. "Holder A60 Cultitrac Skidder", LIRA Machine Evaluation Vol. 7, No. 3, 1982.
- Ref 3. Gaskin, J.E. "Organised Felling for Thinning Radiata Pine", LIRA Report Vol. 8, No. 12, 1983.
- Ref 4. Stewart, I. "Fitting an Igland Winch to a Clark Skidder", LIRA Technical Release Vol. 4, No. 3, 1982.
- Ref 5. Prebble, R.L. "Chain Strops in Skidder Thinning", LIRA Report Vol. 7, No. 7, 1982.