

Towtem Articulating Grapple Clam

BACKGROUND

The Towtem Articulating Grapple Clam is a fixed head, clamshell bucket attachment which can be used to replace the backhoe bucket on an excavator (Figure 1). Previous study of the Towtem by Bennett (1992) highlighted the versatility of this attachment, particularly for forest road construction.



Figure 1 - Towtem articulating grapple clam

GRAPPLE CLAM SYSTEM

The grapple clam utilises two hydraulic circuits to control movement. One circuit opens and closes the two bucket halves, while the other controls rotation to the left or right. The grapple clam is capable of 360° rotation.

FOREST ROADING OPERATION

Recently an earthmoving contractor in North Canterbury imported a Towtem

Articulating Grapple Clam (Model No. 84) for his Hitachi EX270 excavator. This machine was being used in a forest roading operations in Carter Holt Harvey Forests Limited's, Omihi Forest.

This machine was observed for three days during which it was used for contour skid track construction, shovel logging, log sorting, and skid track rehabilitation.

Track Construction

During the study, 218m of skid track was observed being constructed. Much of the construction time comprised earthworks. Although this could have equally been performed with a conventional backhoe attachment, the grapple clam did have some advantages because of the ability to stump and shovel log roadlines. This meant that track construction did not require the stems to be removed from the roadline using a skidder.

Using the grapple clam, stumps were removed and carefully placed to prevent stumps rolling down hill. Any standing trees left by the faller were able to be removed and bunched (Figure 2). Overhanging branches that are a hindrance can be sheared off by closing the buckets on the branch.

When digging, the two buckets remained fully open, and a single bucket digs like a backhoe bucket. Once the earth has been loosened, it is simply grabbed by closing the two bucket halves, moved to the side

and then dumped by opening the buckets. The surface is then smoothed by gripping a small log in the jaws and then sweeping the loose material off the surface.



Figure 2 - Towtem removing tree

Log Sorting

The grapple clam was also used to sort logs and load trucks, similar to a knuckleboom loader. The ability to continuously rotate the head, enabled logs to be rotated for correct placement. Due to the fixed head, logs could be grabbed at any position along their length. If required, the two bucket halves can be replaced by grapples to increase log handling efficiency.

Track Rehabilitation

Some skid tracks in Omihi Forest have been rehabilitated using the grapple clam. Slash and earth from above and below the track were pulled on to the track surface, re contouring the slope. The grabbing action of the grapple clam makes it an ideal tool to move large quantities of slash.

LIMITATIONS

- The backhoe bucket has a greater volume capacity than the grapple clam.

- The straight edges on the grapple clam can damage logs. However, by thickening the bucket edges the amount of logs damage can be reduced.
- Only one log can be lifted at a time using the two bucket halves.
- The grapple clam cannot pick up logs greater than 80 cm in diameter.

SPECIFICATIONS

There are various different Towtem sizes available as shown in Table 1. The attachments can either be a clamshell bucket, brush rakes, log loading tines or the rock/road building bucket.

MODEL	WEIGHT (tonnes)	CAPACITY (m ³)
45	0.3	0.1
50	0.4	0.5
60	0.7	0.4
72	1.1	0.6
84	1.6	0.8
100	2.5	1.1
110	3.3	1.5
120	4.1	2.3

Table 1 - Towtem models available

The cost to import and attach the model 84 Towtem with the clamshell bucket (Figure 1) was \$60,000.

The Towtem distributor in New Zealand is Shelterwood International Limited, PO Box 4596, Christchurch.

REFERENCE

Bennett, D.M. 1992. Articulating Grapple Clam Attachment for Excavators. FERIC, Field Note No. 29, April.

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