

ADAPTING LARGE MOBILE HAULERS TO THE SECOND CROP LOGGING

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**WHY ARE WE CONSIDERING USING THE LARGER SPAR YARDER COMBINATIONS FOR LOGGING THE NEXT CROP?**

**WHY IS IT QUESTIONABLE?**

Over the past 20 years the 90ft tower 450 hp 009 Madills have been the backbone of the old crop logging scene in the central plateau area of the North Island. Stands with piece sizes up to 8 m<sup>3</sup> have been logged with Highlead and Scab Skyline systems.

Looking at the past history of logging machinery and the exit of the large companies from the logging operations, I am sure that under-capitalised contractors will be looking to utilise the 10 machines now existing in New Zealand. A few years ago, haulers converted from ships deck winches, traction engines, farm tractors, were quite common. There are probably some steam haulers converted to diesel still operating.

When one considers that the new generation machines coming from the Pacific Northwest of North America (from where most of our cable logging practices have been copied) are going to cost around NZ\$750,000, a logging contractor will need a better contract and a lot more capital than we seem to be able to accumulate.

At a recent LIRA evening when we were being given an overview of what was available, a voice from the floor calls out "are there any secondhand ones for sale".

The 10 Madill 009's in New Zealand and the other 1300 odd that have

been manufactured since 1960 would probably represent an average capital value of NZ\$120,000 and many of them are still in good working condition. As there is a lot of experience in running and maintaining them, along with a good back up in parts from the manufacturers, I believe that another 10 years of useful service can be expected from them.

To replace the same number of machines with new generation multidrum yarders would need an investment of \$5,000,000 for secondhand machines and \$8,000,000 for new ones.

**WHY IS THE USE OF THESE 90 FOOT TOWER MACHINES QUESTIONABLE?**

They are only 2 drum and designed for high lead or scab skyline. This limits the number of pieces that can be stropped each cycle, and causes more line shifts. They are heavy at around 50 tonnes all up and being 27.4 metres long, require good access roads.

To withstand the high line pulls available, heavy guylines are required and the tall tower demands at least six of them. With a haulback speed of 600 metres per minute and an inhaul of 300 metres/min, they will look slow against 800-900 metres/min on the modern machines. Most planners think that a 27 metre tower is too large to set up on a ridge top or on the side of a steep hill. They may be right but you would actually be amazed just where you can locate a 009 if you have to.

13 min turn

Before proceeding to physical modifications, I would like to look at the probable results of logging smaller tree sizes with the 009 as it is. I mention tree size instead of piece size on purpose because I believe 'there' lies the difference in the 2 crops. Trees in the 4 to 5 m<sup>3</sup> size, felled on steep rough country, tend to end up in 2 or 3 pieces whereas 1.5 m<sup>3</sup> trees stay in one piece.

I have always believed that through insufficient planning, lack of variety of systems and our tree length logging practice, most 009's in old crop have been constantly overloaded. They were in fact, designed to haul smaller turns than we have been doing. When the Madills were new, their brake gauges had a red mark on them at 60lbs and a notice saying "excess braking causes loss of power". Our brakes are often up to 140lbs in an effort to get more lift. Less braking will give higher line speeds and quicker cycles. A large percentage of time is spent hauling large turns of up to 8 tonnes but a lot of turns are heads and broken pieces which keep the average turn size down. There is too much of a range between maximum and minimum payloads.

Over a three month period, records kept by my operator show the average turn was only 2.43 pieces. A lot of these turns would have been single large stems and very slow hauling.

From experience and some studies, the longest element of a complete cycle is the time taken to strop up logs. I believe that in 1.5 metre piece sizes, stropping up time will be reduced because of the smaller log sizes i.e. it won't be so hard to get the strop under the log.

With better planning to take advantage of greater deflection, longer strops can be used and this will mean more pieces within reach of the rigging and therefore wider roads and less road changes. Four strops can be used and assuming each turn can average 4 tonnes and 10 minute cycles achieved, production should be in the order of 180 tonnes per 8 hour work day. Experience logging in Tairua some years ago confirms this assumption.

**WE CAN NOW LOOK AT MODIFICATIONS WHICH WILL IMPROVE ON THE STANDARD 009**

Speed up the drums and reduce the line pull by the replacement of the primary drive pinion.

**TABLE 1 : LINE SPEEDS, M/MIN**

		Standard 20T Sprocket	Alternative 26T Sprocket
Main Drum	Bare	187	243
	Mid	267	347
	Full	348	451
Haulback	Bare	511	665
	Mid	739	961
	Full	967	1258

TABLE 2 : LINE PULLS, KG

		Standard 20T Sprocket	Alternative 26T Sprocket
Main Drum	Bare	48,487	37,319
	Mid	33,959	26,128
	Full	26,500	20,112
Haulback	Bare	17,751	13,665
	Mid	12,258	9,443
	Full	9,398	7,219

Line speeds on both the mainrope and tailrope are increased by 30% with the change from a 20 tooth sprocket to a 26 tooth sprocket. There is however a corresponding 23% reduction in linepull with this modification but a 26 tonne mid drum line pull is still well above the 23 tonne SWL (safe working load) of 32mm 6 x 19 wire rope commonly used as a mainrope. In fact loggers may well opt for smaller main and tailropes with the larger sprocket to allow them to log out over greater distances.

It will also allow the use of smaller diameter guylines and thus remove one of the more onerous tasks in re-siting the machine. Replacing the primary drive pinion is the cheapest modification and can be done for about \$1,000.

For \$14,000, a 009 owner could add extra brakes to the mainrope drum and use it as a skyline for shotgunning on suitable uphill settings. The standard tower can be used as long as the machine is not straight in line with the direction of pull. On the angle, there is enough horizontal separation between the fairleads to prevent binding of the ropes.

If line wrapping and binding becomes a problem, an extra lead block can be hung on one of the front quarter guys or an addi-

tional fairlead installed in the top of the tower. Hanging an extra block on a guy costs basically the price of the block whereas modifying the tower could cost up to \$30,000 Canadian. Many towers have been pulled over shotgunning so I would add an extra fixed guy in the back half. Some machines in the States have been fitted with an extra guy drum for this purpose.

Madill 009 towers are designed for a maximum mainrope pull of 90,000lbs. This assumes that the tube is in top condition i.e. no dents or cracks in any part of it. Even the smallest of dents in the tower could cause catastrophic failure if the hauler becomes overloaded using a skyline system.

Some loggers in the US have used shotgun systems with a motorised carriage on their 009's. For an extra investment of between US\$60,000 to US\$140,000, this system offers the mechanical slack-pulling facility of a more sophisticated hauler, without the high capital cost. Limitations are however, that you are restricted to uphill hauling with a shotgun system and, the tower must be in perfect condition (for reasons outlined above). Careful attention should be paid to guylines geometry when using a motorised carriage because in a situation

with limited deflection its linepull can quickly generate forces that will exceed the safe working capacity of the tower.

A major reconstruction of a standard 009 is available at the Madill plant in Kalama. This modification includes the addition of a 4th drum (third working drum) and is known as the 099 Madill. For about US\$200,000, an old 009 Madill is refurbished with a new frame, 3 new drums and the appropriate modification to the drive train. This does not however include modifications to the tower.

Individual loggers in the States have made their own alterations to 009 Madills for a lot less than US\$200,000. One logger (Don Whitaker in Oregon) has added the third drum and shortened the tower to 70 feet for about US\$40,000. Don't be misled though. Don owns something like nine 009's so spare parts to do the modifications were no problem. Very few New Zealander's would be in this position.

## CONCLUSION

I would suggest that because of their low capital value, their long service life and the fact they are here, 009 Madills, combined with the ingenuity of the Kiwi logger, will log many tonnes of second crop radiata, with or without modification. Even when we get back to 50 year old second crop they may still be around. I suspect that if we look hard enough we may still find a modified steam winch pulling logs as well.