New Skidder  Technologies to reduce site disturbance and erosion

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Abstract:
After road construction, skidding is the logging operation with the most impact on forest soil disturbance and erosion. Many manufacturers are now testing new skidder concepts to reduce ground pressure and provide new tools to economically harvest site sensitive grounds.

Introduction:
This presentation shows various innovations and technology developments made by Trans-Gesco over the years to reduce ground pressure and site disturbance and reveals a new skidder concept specially designed for skidding large payload and long trees over soft grounds and steep slopes.

Trans-Gesco is well known in Canada as the manufacturer of the world largest and powerful clambunk skidder, the TG88C. The 35-ton payload capacity TG88C is essentially an off-road hauling truck for long distance economical skidding. A large percentage of our machine population is working in eastern Canada, in the extremely soft ground of the Canadian clay belt. In Quebec, clearcut have been replaced over ten years ago by cut with protection of the natural regeneration. The skidders have to travel over the feller buncher trail and you are not allow to travel over more than 33% of the harvested area. By next spring, this percentage will be reduced to 25%. In order to respect this prescription, many companies are now testing and using harvesting methods like the “two in to one”. So even larger volume of woods have to be skidded over the feller buncher trails and the need of low ground pressure skidders like the Trans-Gesco is increasing.

I would like to show you some of the products improvements and options we offer to reduce ground pressure and site disturbance. With the B series of our TG88 we introduced a new tandem design with planetary drive at each wheel. Since our hydrostatic drive design does not require gears or chain drive in the tandems, we were able to extend the tandem length from 74.5 to 80.5 inches. This has reduced the ground pressure by 0.5 psi. By comparison, most manufacturers offer tandems that are around 60 inches long. This 20 inch long difference can represent up to 2 psi.

We also improved the track design by curving the track shoe ends. This reduce the track cutting effect of the top soil and roots so important to support the machine above the ground. This also improve the steering ability of the machine and reduce surface disturbance. We also extended the shoes width and reduced spacing between each pads for even lower effective ground pressure. The tracks are available up to 60 inches wide. This basically becomes two sheets of plywood walking over the ground!

Our clambunk is usually mounted over the rear tire of the back tandem. But for better weight distribution we offer to center the clambunk over the
rear tandem. This option reduces the rear ground pressure by 0.5 psi.

I would like to show a ground pressure comparison between a conventional wheel skidder and a Trans-Gesco. For the calculations we used FERIC norms with 15% ground penetration. The 748 is equipped with 44” high floatation tires and the weight distribution between the front and rear axles have been estimated. The TG88C is equipped with 54 inch tracks in the back and 48 in the front. We can see that the skidder has a ground pressure on the rear wheels of over 5 psi empty and almost 10 psi with a 5 ton payload. The TG88C with the same payload remains under 4 psi and has a ground pressure of 7.5 psi with a full 35 ton payload. These figures help explaining the good environmental record of the four tandems forwarders.

Now, I would like to introduce a major innovation we have introduced a year ago on our “C” model of the TG88. An in-board computer senses the steering angle of the machine and adjusts the flow of each of the four traction pumps for the required tandem speed. While the TG88C is turning, the two traction pumps activating the faster turning outside tandems are sending more flow than the two inside traction pumps. The result is an exceptional manoeuvrability and the following benefits:

- All tandems locked at all times without any drag
- 100% of the power is available at each tandem at any steering angle
- The wheels become the steering. The steering cylinders are essentially used only to maintain the steering angle
- Able to steer without having to be in movement
- Less ground disturbance
- Dual horse power limiter to maximise driving speed

Now please pay attention to the moving direction of the tandems on this video. You can see one tandem turning forward and one reverse at the same time! Try to do this with a mechanical differential! This is why the TG88C can steer without having to be in motion, resulting in a smaller effective turning radius. You have the manoeuvrability of a small four-wheel drive machine on a large low ground pressure four tandem machine.

New Skidder Concept:

The original clambunk application is widely used in eastern Canada but is not very popular in western Canada. Most of the clambunk working in the larger
timber stands of western Canada have been sold to contractors requiring low ground pressure skidders to work year round. They like the low ground pressure feature of their clambunk skidder but they had some difficulties to overcome. Some of them are:

- Loading the long timber in the clambunk require very high operator skill
- Very difficult to unload at roadside in downhill conditions
- Usually short skid distances since cutting blocks size are smaller in eastern Canada and they are usually designed and felt for grapple skidder.

Our experiences lead us to design a new skidder concept that will be more productive an easier to operate in the typical logging operations found in western Canada. This enormous grapple skidder is essentially a hybrid between a conventional grapple skidder and a clambunk forwarder. The booms fold on the main frame to distribute the load over the rear tandems similar to a clambunk skidder. Normal size wheel skidder bunches can be lift to accumulate multiple tree bunches. The results are:

- A gigantic skidder with extremely low ground pressure for minimum ground disturbance
- Faster loading times and higher productivity on short skid distances
- Easier to load and skid the large and long trees typically found in Western North American timber stands
- The machine can push itself with its boom in difficult ground situations
- Easier to unload at road side in downhill conditions

**Conclusion:**

Forwarders have been using the tandems concept for low ground pressure for years and it is finally available for full tree skidding for grapple skidders. As environmental pressure increase, the definition of site sensitive grounds is changing and the percentage of timber harvested over such site sensitive grounds is constantly increasing. As you visit Demo 2000, you will notice many manufacturers are now testing and introducing new skidder concepts using tandems and tracks. These new skidder concepts are certainly additional solution to woodland managers and high volume loggers facing the extreme logging conditions found in today’s dynamic and rapidly changing forest industry.