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EVALUATON OF EXTE COM90 AUTOMATED SYSTEMS TO REDUCE OR ELIMINATE LOG LOAD SECUREMENT RELATED INJURIES

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The motion of throwing and securing log load wrappers can cause a great amount of stress on drivers' shoulders, with overexertion-related musculoskeletal injuries being quite common among log truck operators. WorkSafeBC has reported 41 overexertion injury claims from 2018 to 2023. Of these injuries, shoulder injuries related to throwing wrappers is a major contributing factor. Load securement related injuries have cost WorkSafeBC more than $2.1 million in the last 6 years. These claims costs include injuries related to throwing, removing, cinching, and tightening wrappers as part of the log load securement process. In addition to WorkSafeBC claims, logging contractors suffer lost revenue due to missed trips with load securement related injuries. Of note, the contractor participating in thus study currently has a driver injured due to load securement related activities, with lost time of 9 months to date. Lost time costs from this were at least $75,000 and could have reached up to $385,000, if the fleet owner could not find a replacement driver. Therefore, the BC Load Securement Working group (a subcommittee of the Log Truck Technical Advisory Committee) initiated a project to evaluate Exte's Com90 automated load securement system's suitability for eliminating load securement related injuries in BC log hauling operations.

Objectives

- Evaluate Exte Com90 compliance with CVSE and BC regulatory requirements.
- Study the Exte Com90 automated load securement system in a BC log hauling environment.
- Explore the possible adaptations of this system to address BC log hauling needs.
- Examine safety and possible productivity improvements in cycle time due to Com 90 system and perform a cost benefit analysis.

System Description

Exte's Com90 consists of bunk(s) with retractable upper stakes and lashing arms that restrain the load as shown in Figure 1. The system is hydraulic based and is controlled by the driver using a remote-control unit. The tension on the load is automatically monitored and controlled throughout the journey from loading to the unloading site. The maximum stake height from the bunk is 3 m and minimum is 1.7 m within the load envelope of Com90 system.

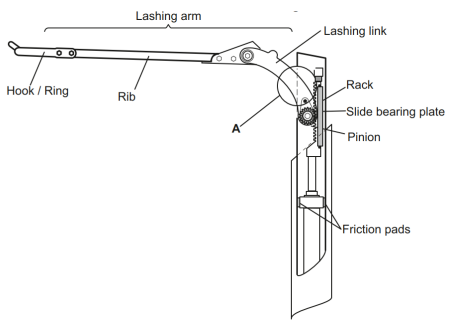

Figure 1. Schematics of Exte Com90 (Image source – Exte reproduced with permission)

Regulatory Compliance

The system complies with NSC Cargo Securement Part 10 and WorkSafeBC regulations for logs loaded lengthwise with maximum bundle weight of 18,000 kg (Garnier 2024). The overall height while piggybacking, or carrying the trailer, was also within the allowable limit of 4.3 m (CVSE1000 Permit).

Installation

The Exte Com90 was installed on a brand-new Kenworth T880 truck and Peerless quad-axle trailer combination in May 2024. The bunk width for both tractor and trailer was 2.6 m (8’ 6”). Exte currently doesn’t have a wider bunk option but has plans to develop one. The system itself is hydraulic, using viscosity 22 grade fluid. The hydraulic pump has an output of 38 litre/min (10 gallon per min) which generates pressure of 150 bar (2250 psi).

Operational Performance

The system was put in operation in September 2024, with a driver having over 40 years experience operating a logging truck. As of February 12, 2024, the truck travelled 40,000 km with 1,000 engine hours and completed 165 successful trips using the Com90 system. On average, two trips a day were completed and 6,700 tonnes of logs (3 to 6.7m length) were transported.

Overall, the system worked very well. A few minor issues were addressed during the trial which included the loader having to occasionally grab the sides of logs from the top of the load to ease off the pressure on the stakes while the Com90 was retracting the stakes to create appropriate tension on the log bundle. (Figure 2).

Figure 2. Com90 in loaded conditions

During the load tensioning process, the display in the cab (Figure 3) lets the driver know whether the required tension on each bunk has been achieved or not. In this way, the driver and loader operator worked together to ensure proper system tension and load securement.

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Figure 3. In cab display

During the five months study period, the driver only had to throw the backup set of wrappers on six occasions. Some of the issues were:

- Initially the lashing arms of front bundle would not bind the load completely, which was later on resolved with the use of loader's assistance,
- a hydraulic oil leak, and
- a hose damaged during operation.

Figure 4 shows the truck piggybacking the trailer with Com90 lashing arms hanging loose and extending approximately one inch on either side of the bunk(s).

Figure 4. Com90 in unloaded conditions

During the trial the system was subjected to +31 °C to -28 °C. In summer, the system was exposed to mud and dirty conditions. The driver kept the system clean with occasional cleaning of the bunks and sweeping the dirt off the Com90 components. In winter, the driver reported the system response was slightly slower while operating in sub-zero conditions.

Maintenance

In the 5-month trial, a couple of hoses were replaced. as well as the front stake on the passenger side as a result of a lashing arm failure due to mechanical damage.

Payload

The allowable gross vehicle weight for this truck and trailer configuration in BC is 63,500 kg. The tare weight of the truck with the Com90 was around 19,600 kg in summer whereas the similar truck configuration with 2.9 m (9' 6") wide bunks weighs around 19,200 kg. In winter, both trucks are 200 kg heavier due to tire chains. Table 1 illustrates the comparison of an average payload for the Com90 equipped truck and a similar truck and trailer configuration at various mills delivering different products. One key difference between a standard truck and the Com90 equipped truck was the bunk width, which was 2.6 m vs the more typical 2.9 m (with permit). For sawlogs more than 5.2 m (17'), there was no major difference in payload between the two trucks; whereas for sawlogs less than 5.2 m (17'), the difference in average payload was 1 tonne and for pulp logs the difference in average payload was 7 tonnes. The use of 9' 6" bunks will largely eliminate the payload gap between Com90 and regular trucks for pulp logs and saw logs less than 5.2 m.

Table 1. Average payload from delivery at different mills in Interior BC during trial period

Mill	Log Type	Average payload (tonne)	
		Com90 truck[a]	Regular truck[b]
A	Saw logs (20' x 22' logs)	42.1	42.2
B	Saw logs (16' logs)	41.9	43.4
C	Pulp logs (10'-20' logs)	35	42
D	Saw logs (17'-18' logs)	44.1	44.5

[a] Truck and trailer width 2.6

[b] Truck bunk with 2.9 m and trailer bunk with 2.6 m

Time Savings

The time for load securement activities in the bush and at the mill were compared in order to determine the difference between traditional methods and the Com 90 system. On average, there was 18 minutes time savings per trip with the Com90 system. Table 2 illustrates the time and its components.

Table 2. Comparison of load securement time

Task	Traditional load securement time (min)	Automated load securement time (min)
Load Site		
Straighten stakes	2	0
Load Securement		
Bundle 1	1.9*	0.2
Bundle 2	1.9*	0.2
Bundle 3	1.9*	0.2
Load check (checking wrappers	1.7	1
Subtotal	**9.3**	**1.6**
Unloading Site		
De-wrapping station (removing wrappers and coiling them)	7.20	0
Lowering stakes at clean-up area	3	0
Subtotal	**102**	**0**
Total	**19.5**	**1.6**
Difference	18 mins/trip	

* Weighted average (Shetty 2013)

At the loading site, it takes a few seconds longer for the driver with the Com90 to disconnect and connect additional cables associated with the system. The driver with the standard truck and trailer had to spend extra time to straighten the stakes just before loading and to execute load securement procedures at the hammer location. At the mill, the truck with the Com90 was able to skip both the de-wrap station that drivers use to undo the wrappers and the clean up area where drivers lower the stakes before piggybacking the trailer. Any queue time at the mill site was not accounted for in the time comparison.

As a note, the Com90 driver did get out of the cab, to get a clear view of the loading and system tensioning process while operating the system via remote control. The driver can also operate the system within the cab (Figure 5). The addition of an external camera with an in cab viewing screen to confirm load tensioning is a consideration for in cab operation.

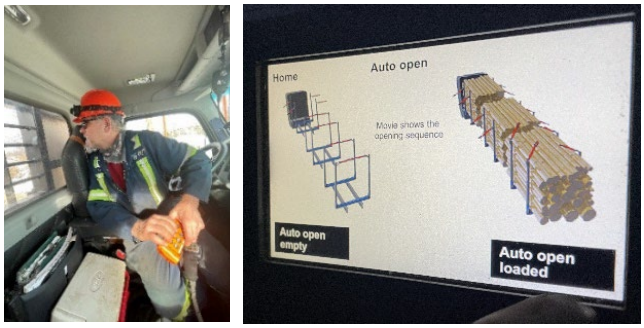

Figure 5. Operating the Exte system with remote controller inside the cab (image left) and view of in cab dashboard for loaded and unloaded condition (image right)

Cost Benefits Analysis

The overall cost of the Com90 system was around $150,000 (this is a one-off purchase price). With volume, the price of the system is expected to come down. Table 3 present the cost components in this trial.

Table 3. Overall cost of Com90

Cost Components	Add or subtract	Cost
6 Com90 bunks, some spare parts and driver training	+	$150,000
Additional required accessories such as pump, and hydraulic tank	+	$15,000
Installation cost	+	$5,500
6 standard bunks	-	$24,000
Overall Cost	**=**	**$146,500**

Based on interviews with the mechanic, driver and fleet owner, one could expect a maintenance cost of $3,000 to $4,000 per year. In terms of cost benefits related to time savings, cost savings per year based on the number of trips a day is illustrated in Table 4.

Table 4. Savings per year for number of trips per day

# of trips a day	Cycle time	Truck Payload	Additional Loader time*	Injury Cost	Total Saving per year
2	$22,700	-$4,300	$9,000	$5,100	$32,500
3	$34,000	-$4,100	$9,000	$5,100	$44,000
4	$45,000	-$4,000	$9,000	$5,100	$55,100
5	$56,000	-$3,900	$9,000	$5,100	$66,200
6	$68,000	-$3,700	$9,000	$5,100	$78,400

* Loader assist/draping wrappers for driver

The calculation of time savings for a 3 trip per day haul is illustrated in the appendix as Example 1.

Figure 6 presents the cost benefit sensitivity analysis with dotted lines as a cumulative cost (status quo purchase price and 25% reduction in purchase price) and solid lines as cumulative benefits for 2 to 6 trips a day. The intersection of the cost and benefit lines shows the breakeven period. In addition to improved safety, there are other cost benefits such eliminating driver lost time due to load securement injuries and improving worker retention and recruitment. In comparing the Com90 to loader assist operations, Com90 eliminates the need for draping the wrapper over the load and savings are illustrated in the appendix as Example 2. The example of additional trip(s) gained is illustrated in the appendix as Example 3. The example of the impact of reduced payload is illustrated in the appendix as Example 4. The example of the incurred load securement injury cost is illustrated in the appendix as Example 5.

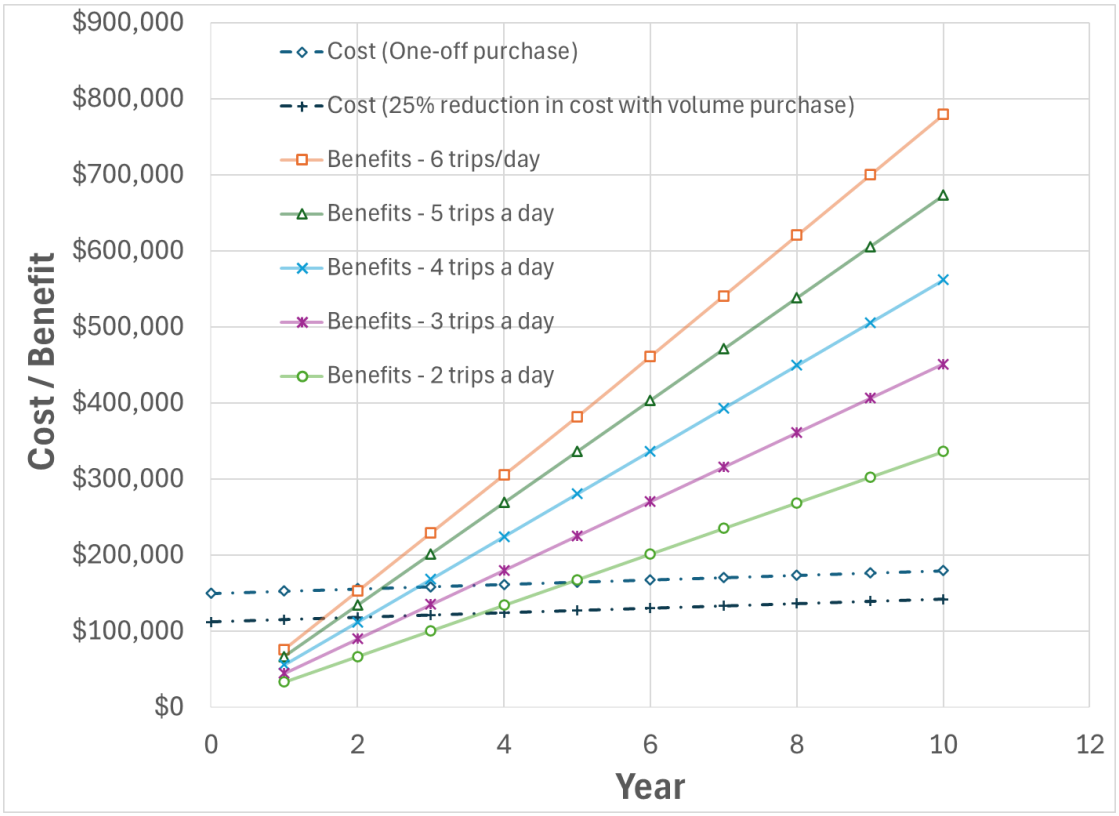

Figure 6. Cost benefit sensitivity analysis for six (6) bunks Com90

Discussion

With reduced physical demand on the drivers, the older drivers might stay longer knowing the hardest part of the job is now easier to perform. In addition, this would also allow to attract a whole new demographic of drivers that would not possibly be able to throw the wrappers over the load at the current rate of throwing wrappers per shift. By not having drivers near the loads, minimizes exposure to unsecured loads and other hazards faced when outside the truck. Thereby, eliminating the risk of fatalities due to logs falling onto drivers when checking the load or releasing wrappers in traditional load securement method. With loads secured to the bunks, the load stability is improved during upset conditions as reported by one of the users of Com90, which was based on their learnings from a roll-over incident of a truck with Com90 system. By eliminating the load securement related injuries, truck utilization is improved, and truck downtime is minimized.

In summary, benefits of the system include:

- Eliminate the need to throw, cinch and remove cable wrappers which are the leading cause of soft tissue injuries amongst drivers.
- Improve driver retention via reduced injuries.
- Eliminate the use of stake extension, eliminating another cause of soft tissue injuries.
- Improved overall securement of loads versus traditional cable wrappers.
- Reduce load and unload times.
- Improve driver recruitment by reducing physical demands.
- Minimize exposure to unsecured loads and other hazards faced when outside the truck.
- Eliminate fatalities due to logs falling onto drivers when checking the load or releasing wrappers.
- Improve load stability during upset conditions.
- Increase truck utilization/minimize downtime due to load securement related injuries.

Potential Adoption

Although the system performed well over the term of the trial there is some room for improvement, which includes:

- installing a higher-pressure pump in consultation with the manufacturer to address the intermittent case where the stakes failed to fully retract. It should be noted that the contractor installed a higher-pressure pump at the end of the trial.
- use 2.9 m (9’6”) bunks in order to maximize payload, which would be particularly beneficial when hauling pulp logs and saw logs less than 5.2 m (17’). Exte has indicated 9’6” wide bunks will be available as an option in the future.

In conclusion

The Com90 system met both regulatory and operational requirements, performed well, and overall, the driver liked the system. The Com90 appears to be a viable solution for the BC forest industry to improve efficiency, reduce risk, and eliminate injuries related to log load securement. With a higher-pressure pump and wider bunk the Com90 has the potential to further improve financial returns.

Appendix

Input from industry on potential operational savings for scenarios that are common in BC operations are as follows:

- **Example #1 illustrates operational savings with the Com90 on a 6-bunk truck and trailer combination for 3 trips per day when compared with the traditional load securement methods**

Assuming 180 operating days/year, the number of trips per year is 540. The time savings of 18 minutes per trip translate to 9720 minutes or 162 hours per year. For the trucking rate of $210/hour, the savings will be $34,000/year. If no additional trips are made in a year, there will be no savings in ownership or fuel costs. However, at times there would be a gain with additional trips as time savings making up for slow loading, slow dump times or minor repairs allowing the operator to go back for another trip.

- **Example #2 illustrates operational savings with the Com90 for 3 trips per day when compared with loader assist load securement methods**
  For a three-trip haul per day with a savings of 5 minutes per load per truck translates to 120 minutes or 2 hours/day savings with loader doing 24 loads per day serving 8 trucks. With a loader rate of $200/hour, costs are$400.00/day. With 180 operating days, the savings per truck would be around $9000 ($72,000/year/ 8 trucks). This savings in loader time allows the loader to do other activities such as loading more trucks, debris piling, sorting or prepping wood for loading.
- **Example #3 illustrates an additional trip scenario for two trips per day**
  Assuming a maximum of 13 hours of driving time of 15 hrs allowable duty time, the cycle time for two trip is 7.5 hr. If the cycle time is 7.8 hrs, then a truck will not be permitted to haul a second load whereas the truck with Com90 system could achieve a second load due to the time savings. This gain in the extra load per day would be considerable in terms of annual hours.
- **Example #4 illustrates the impact for the reduction of 400kg payload due to the increased tare weight of the Com 90 equipped truck.**
  Tare weight of Com 90 equipped truck = 19,600kg. Tare weight of similar truck 19,200kg.
  Assuming 180 operating days/year, the number of trips for a 3-trip haul is 540. A payload decrease of 400kg/trip equals 216,000kg/year or 216 tonnes. $210/hr/42 tonne payload = $5/tonne hour.
  216 tonnes * $5/tonne/hr * 3.8 cycle time = $4,100/year of lost revenue.
- **Example #5 illustrates the actual cost impact experienced by a large hauling contractor for load securement injuries occurring over a seven-year period.**
  Incurred load securement injury costs over 7 years = $5,001,005 or $714,285/year. $714,285/140 trucks = $5102/year/truck.

For more information

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References

Garnier J. 2024. Safety evaluation of EXTE COM90. FPInnovations Report

Shetty M. 2013. Overexertion Injuries Resulting from Installing Log Load Wrapper. FPInnovations Contract Report CR-754-WCB