

BIGFOOT

CENTRAL TYRE INFLATION SYSTEMS



Benefits of Bigfoot CTI Systems:

Stakeholder views and competitive
advantages and disadvantages

By Dr. Glen Murphy



Contents

1. Executive Summary.....	3
2. Background.....	3
3. Assessment of the perceived benefits of BIGFOOT CTI systems.....	4
3.1 Methods.....	4
3.2 Survey Results: Truck Owners.....	5
3.3 Survey Results: Truck Drivers.....	9
3.4 Survey Results: Land Owners.....	13
6. Summary and Implications for BIGFOOT.....	22

*Final Report: 2 April 2017
G.E. Murphy & Associates Ltd.
134 Tarawera Road, Rotorua
Ph: +064-22-311-8611
Email: gemurphy.nz@gmail.com*

1. Executive Summary

G.E. Murphy & Associates was asked to undertake research that would facilitate marketing of BIGFOOT'S CTI systems in national and international markets. The first phase of the research - an independent international literature review of the benefits and costs of using CTI from the perspectives of truck owners, truck drivers, road owners and land owners - was completed in 2016.

In this second phase stakeholder views were gathered from 75 completed survey forms and the competitive advantages and disadvantages were identified through searching the web-sites of BIGFOOT's main competitors and visiting BIGFOOT's operations in Rotorua.

The surveys were able to confirm many of the advantages of using CTI systems that were identified in the international literature review. The surveys also provided more than sixty comments that could be used by BIGFOOT for marketing its systems.

The number one reason that truck owners gave for fitting CTI systems to their trucks was that it was required in their contracts. Productivity improvement and cost savings were ranked second and third. Promoting the benefits of CTI to external stakeholders, such as roading authorities and land owners, should be included in BIGFOOT's marketing strategy.

BIGFOOT's website could be improved by better reflecting the range of industries it serves (i.e. broader than forestry) and its international footprint, by the use of endorsements to sell the benefits of its systems, and by the provision of tools to help both its potential customers and existing customers realize the benefits of CTI.

2. Background

Bigfoot Equipment Ltd (BIGFOOT) has been leading the development of central tyre inflation systems for use around New Zealand and further abroad since 1994. BIGFOOT CTI systems are now being used in New Zealand, Australia, UK, Sweden, Ireland, USA, Canada, Chile and Laos.

G.E. Murphy & Associates was asked to undertake research that would facilitate marketing of its CTI systems in national and international markets. The first phase of the research - an independent international literature review of the benefits and costs of using CTI from the perspectives of truck owners, truck drivers, road owners and land owners - was completed in 2016.

This report relates to the second phase of the research. The three goals of the second phase were to:

- Assess the perceived benefits of BIGFOOT CTI systems to truck owners, truck drivers, road owners and land owners who are familiar with the BIGFOOT CTI systems
- Identify the distinguishing features of the CTI systems marketed by BIGFOOT's main competitors, and
- Assess BIGFOOT's production methods with a view to identifying opportunities for either saving costs or adding competitive value to its product line.

The work relating to the three goals is first described separately and then summarized with comments on the implications for BIGFOOT.

3. Assessment of the perceived benefits of BIGFOOT CTI systems

3.1 Methods

Four sets of survey forms were prepared to elicit the views of stakeholders with a potential interest in CTI systems; namely, truck owners, truck drivers, road owners and land owners. The questions within the survey forms were framed around information obtained from the international literature review. It was expected that the survey forms would not only assist in gathering information suitable for marketing BIGFOOT’s CTI systems but would also educate stakeholders on the benefits of CTI systems. Copies of the survey forms already reside with BIGFOOT and so will NOT be included as appendices to this report.

150 Truck Owner survey forms were emailed to owners in New Zealand, Australia, Canada, USA and the UK in early January. In addition each truck owner was sent a Truck Driver survey form and asked to get one or more of their drivers to complete it. A reminder email was sent to truck owners in mid-February. Response from the email survey was disappointing; returned survey forms were obtained from only five truck owners and 1 truck driver.

The number of “completed” 1 Truck Owner forms was expanded to 15 by one-on-one personal interviews via telephone calls (Ireland, Rotorua, Gisborne and Nelson), on-site visits to a trucking company in Rotorua and Broadlands, and talking to owners as they passed through log scaling checkpoints at the Port of Tauranga and Eastport. The 15 truck owners included large and small owners responsible for a total of 139 trucks.

Similarly the number of “completed” Truck Driver forms was expanded to 51 by one-on-one personal interviews with truck drivers as they passed through checkpoints at the Port of Tauranga and Eastport.

Land Owner survey forms were emailed to 15 forest companies in New Zealand; these were the larger forest companies currently harvesting timber from their estate. After follow-up reminder phone calls and a personal visit to one forest company, a total of 9 completed forms were obtained.

The Road Owner survey form, although developed, was not emailed out since the land-owners in New Zealand are generally the road owners as well.

Drivers and owners were not specifically asked whether their trucks were fitted with BIGFOOT CTI systems. BIGFOOT’s customer list was used to determine the number of respondents who had BIGFOOT CTI systems on their trucks (Table 1). Some trucks had been fitted with a CTI system by the previous owner. The number of respondents with BIGFOOT systems may, therefore, be understated.

Table 1. Number of completed survey forms

Type	Total number of respondents	Respondents with BIGFOOT systems
Truck Owners	15	10
Truck Drivers	51	35
Land Owners	9	NA
Total	75	45

3.2 Survey Results: Truck Owners

Almost all of the respondents (87%) to the truck owner survey were from New Zealand. One owner from Ireland also completed the survey form. Comments from one owner in Canada were also provided by Paul Jensen. The main area of activity for truck owners was log transport (86%). Gravel (7%), bulk cartage (7%), fertilizer spreading (13%), whey spreading (7%) and livestock transport (7%) were also activities undertaken by the owners surveyed. Percentages add to greater than 100 because some respondents carried out multiple activities with their truck fleet.

The truck fleet size of those surveyed ranged from 1 to 55 trucks. About a third of the respondents were single truck owner/drivers, about a third were small to medium fleet size owners (2 to 4 trucks), the remaining third were large fleet size owners with more than 10 trucks. The number of trucks in each fleet that were fitted with CTI ranged from 1 to 28 trucks. One truck (from Ireland) had CTI fitted to all axles. One truck (from New Zealand) had CTI fitted to the drive axles and trailer axles. The remainder of trucks had CTI fitted only to the drive axles.

The capital costs for purchasing and fitting of CTI systems depend on the country and number of axles fitted with CTI. Some of the surveyed truck owners (20%) did not know what the capital cost of their CTI system was since it was already on the truck when they bought it. For those owners

who did know the capital cost of CTI, it ranged from NZ\$3500 to NZ\$27000 and averaged about NZ\$9600. The lowest capital cost was for a CTI system fitted only to the drive axles and did not include a control system. The highest capital cost was for an Irish truck that had CTI fitted to all axles and included the cost of maxi tyres.

The international literature review carried out in 2016 indicated that payback periods for CTI systems ranged from 1.2 to 4.8 years. More than half of the truck owners surveyed (58%) did not know what the payback period for their system was. For those owners who did know (42%), the payback period ranged from 1 to more than 5 years, with an average of a little over 3 years.

The international literature review indicated that reductions in vibration related repairs to those trucks using CTI systems ranged from 12% to 83%. Most of the truck owners surveyed (75%) did not know what reduction in repairs was caused through the use of CTI. One owner knew that there was a reduction but could not quantify it. For those owners who did know, the reduction ranged from 1 to 60% and the average reduction was about 27%.

The international literature review indicated that fewer drive-train failures were reported for those using CTI systems. More than half of the truck owners surveyed (58%) did not know if there were fewer drive-train failures resulting from the use of CTI. 9% of owners said that CTI did not result in fewer failures. The remainder (33%) believed that there were fewer failures.





Ten trucks (all similar and all with competent drivers) were sent to a woodlot with soft soils. All of my eight trucks were fitted with CTI. They went into and out of the site without any problems. Two of my competitors sent trucks without CTI. They got stuck. I got to finish the job - and the extra business!!



The international literature review indicated that improvements in overall vehicle life, ranging from 70 to 100%, have been reported for trucks using CTI systems. Most of the truck owners surveyed (67%) did not know if vehicle life was improved or not. 25% of owners said that CTI improved vehicle life by 10 to 25%. The remainder (8%) believed that vehicle life was improved by 50 to 75%. For those owners who knew if vehicle life was improved or not, the average improvement in vehicle life was about 29%.

The international literature review indicated that tyre failures and wear reduction, ranging from 0 to 50%, have been reported for trucks using CTI systems. A third of the truck owners surveyed (31%) was unable to quantify reduction in tyre failures and wear resulting from the use of CTI. For those who could quantify it, the level of reduction ranged from 0 to 40%, but most said between 10 and 20%. The average reduction was about 18%.

The international literature review indicated that fuel consumption changes, ranging from a 30% increase to a 30% decrease, were reported for those using CTI systems. Most of the truck owners surveyed (69%) did not know if fuel consumption changed as a result of using CTI systems.

Those who did know indicated that it had no effect on fuel consumption (15%), increased fuel consumption by 1 to 5%, or decreased fuel consumption by 1 to 5%. The average change for those who did know was a 0% change in fuel consumption.

The international literature review indicated that traction and mobility were improved for those trucks using CTI systems. ALL truck owners agreed with this finding. The following examples were provided by the owners of how improvements in traction and mobility have helped their operations:

- “CTI significantly reduces the amount of pushing and pulling that has to be done.”
- “There is a massive improvement in traction for climbing hills in paddocks. I don’t have to use the diff locks as much.”
- “There is less downtime and less wear, tear and damage from pushing/towing.”
- “Customers get us to cart their logs because our trucks always get out of skid sites.”
- “I’m able to negotiate hills where non-CTI trucks can’t get out.”
- “Never need assistance getting out of difficult, sticky places.”
- “Ten trucks (all similar and all with competent drivers) were sent to a woodlot with soft soils. All of my eight trucks were fitted with CTI. They went into and out of the site without any problems. Two of my competitors sent trucks without CTI. They got stuck. I got to finish the job - and the extra business!!”

The international literature review indicated that improvements in grade climbing ability have been reported for trucks using CTI systems. Most of the owners surveyed (93%) said that their grade climbing ability is improved in trucks fitted with CTI.

One owner thought there was no improvement. The remaining owners did not know if there was an improvement or not. Not all owners who said there was an improvement were able to quantify how much steeper grade could be climbed. For those who were able to quantify it, the average increase in grade was about 5%. The range was from 0% increase in grade to greater than 7% increase. Many examples were provided of how improvements in grade climbing ability have helped them in their operations. These include:

- “I can climb hills a lot better with less mess to the paddock.”
- “There is less road damage and no hill roads ripped up.”
- “My truck can get into and out of most skid sites unassisted.”
- “Other trucks [without CTI] can’t get out of areas I can. CTI is awesome in paddocks.”

The international literature review indicated that higher operating speeds, particularly over rougher terrain, have been reported for trucks fitted with CTI systems. This can lead to improved trucking productivity. There was no clear agreement from truck owners on this issue. 36% thought that CTI allowed faster travel speeds, 14% thought it resulted in slower travel speeds, and 36% thought it had no effect on travel speeds. The remainder (14%) of truck owners did not know if it had an effect on travel speeds or not.

The international literature review indicated that reduced downtime, due to vehicles getting stuck, shock and vibration equipment failures, and punctures, has been reported for trucks fitted with CTI systems. This can lead to improved trucking productivity. ALL of the truck owners surveyed said that CTI systems led to reduced downtime.

The international literature review indicated that greater gross payloads have been reported for trucks fitted with CTI systems due to greater mobility on soft soils and steep grades. This can lead to improved trucking productivity. Two-thirds

of the owners surveyed (64%) did not believe that gross payloads were increased with CTI. A quarter of owners (29%) thought CTI did result in increases in their payload, although only one owner was able to provide an estimate of how large the increase was (a 10% increase was reported). One owner (7%) thought it led to a reduced gross payload.

The international literature review indicated that some roading authorities allow greater payloads on public sealed road for trucks fitted with CTI systems. Truck owners considered this finding to be not applicable to New Zealand (or Ireland) at this point in time.

The international literature review indicated that an increased operating season, due to improvements in mobility and reduced impacts on private and public roads, has been reported for trucks fitted with CTI systems in some regions of the world. Over half of the owners surveyed (58%) said that CTI systems increased their operating season. The remainder said that it either had no effect on their operating season (21%) or was not applicable to their operations (21%). Many of those owners who did say it extended their operating season were unable to quantify by how much it extended their season. One owner indicated an extra “ 3 to 5” days per year, another just commented that “with CTI we can be out spreading fertilizer on wet paddocks, whereas previously we had to wait until the paddocks were drier”.

The international literature review indicated that truck owners have found it easier to recruit and retain drivers for trucks fitted with CTI systems as a result of the improved vehicle ride and health benefits, and the increased revenue from more hauling days per year and fewer delays. Most of the owners surveyed (80%) said that CTI systems did NOT make it easier for them to recruit and retain drivers. The remainder (20%) did not know if it made it easier or not.

Truck owners were asked how mechanically reliable they have found CTI systems to be. Most owners found CTI systems to be either “very reliable” (69%) or “moderately reliable” (23%). One truck owner ticked the “very unreliable” category on the survey form, but this is probably a mistake by the owner since he later wrote that he would not do without CTI on his truck. Some owners provided additional comments about the reliability of CTI systems. These included: “Tire boss is moderately reliable”, “Bigfoot is extremely reliable”, and “Bigfoot is awesome”. One owner commented that he put CTI in the “moderately reliable” category instead of the “very reliable” category because drivers sometimes forget to turn off the taps at the end of the day.

Truck owners were asked whether they considered CTI systems to be an “add-on” to their trucks or an integrated part of the truck. Over half (58%) considered it to be an “add-on”, the remainder (42%) considered it to be an “integrated part”.

Truck owners were asked to provide the reasons for fitting CTI to their trucks. More than one reason could be given, so percentages add to greater than 100. Two thirds (67%) fitted CTI because it was required in their trucking contracts. Half (50%) fitted CTI because it improved their productivity. A little under half (41%) fitted CTI because it reduced their operating costs. A third (33%) fitted CTI for other reasons; namely, “better traction”, “driver comfort on rough paddocks”, and “it is a selling point for getting jobs”.

Vulnerability of hoses was the impediment most often mentioned by the truck owners surveyed when they were asked what were the impediments to fitting and using CTI systems on trucks? Fertilizer spreading and whey spreading truck owners commented that they “have to be careful not to damage wheel hoses on gateways”. Other truck owners said “ripping hoses off” or “sticks may

hit the hub centre, damaging hoses and breaking the hub setup”. Other impediments mentioned were “initial costs and continuing repairs and maintenance costs”, “added complications when changing tyres”, “tyre companies don’t like CTI”, “CTI tends to wear out rims faster”, and “the need to train operators in how to use CTI [correctly]”.

Truck owners were given the opportunity to provide additional comments if they wished to. Following are a selection of the additional comments made:

- “If I had known CTI was this good I would have had it on my truck years ago. It’s incredible”.
- “Sometimes you only need CTI for 100 m, but that is the difference between being stuck and not.”
- “Drivers love it because it softens the ride”.
- CTI gives “Much better driver comfort in bumpy paddocks as the tyres absorb small bumps”.
- “CTI increases daily efficiency of trucks by keeping the unit moving in below average conditions”
- “I would certainly have [CTI] on more than one truck but I’m not compensated for it by the forest owner”.
- “I will fit CTI to any new trucks I get”
- “Amazing increase in traction with CTI”
- “The downside is that forest managers see what is achievable with CTI trucks and skimp on roading expenditure. This is not compensated for by an increased cartage rate.”
- “Land owners build or maintain poorer quality roads since they know your trucks can get in and out again”.
- “Bigfoot were great guys to deal with and very helpful”
- “If one of my trucks gets a small puncture (e.g. a nail) with CTI it can keep going until the end of the day – I don’t lose a day of production”.
- “The use of CTI will expand from forestry to other industries. I am already seeing it on stock trucks, agricultural applications, quarry trucks, etc.”



3.3 Survey Results: Truck Drivers

Almost all of the respondents (98%) to the truck driver survey were from New Zealand. One driver from Ireland also completed the survey form. The main area of activity for all drivers was log transport. One driver was also involved with bulk cartage.

The average length of experience driving trucks (with or without CTI fitted) was 20.5 years. Driver experience ranged from 1.5 to 60 years. On average drivers had 8.7 years of experience driving trucks fitted with CTI systems. CTI experience ranged from 0.5 to 25 years.

The international literature review carried out in 2016 indicated that almost every driver involved with the use of CTI systems has commented on the improvement in vehicle ride. Close to 90% of the truck drivers surveyed thought that, compared with no CTI, the ride of trucks fitted with CTI was “slightly better” (23%) or “much better” (65%). A small percent thought it was “worse” (6%), “the same” (4%), or did not know if it was different. At this point it should be noted that there were a few drivers who were obviously anti-CTI and responded negatively to almost every question asked of them.

The international literature review indicated that some studies have shown that reduced tyre pressures lead to a reduction in vibration and shock transmitted to the truck and to the driver’s seat.

Almost three-quarters (74%) of the drivers surveyed thought that CTI reduced vibration at the driver’s seat. A fifth (18%) did not think it reduced vibration. The remainder (8%) did not know if it reduced vibration or not. Those drivers who thought that vibration was reduced said it was most likely to be reduced “on really rough, unsealed roads”, “when taking off under load” or “when the vehicle is unladen and only has the trailer on”. They said that it was least likely to be reduced “on smooth”, “highway roads”, “under normal operating pressures”.

The international literature review indicated that some drivers commented that they were less fatigued at the end of the day after driving trucks fitted with CTI systems. More than half (58%) of the drivers surveyed did not agree with this comment – most noted that they were still fatigued at the end of the day. Only a fifth of drivers (21%) said that they were less fatigued at the end of the day. The remainder (21%) did not know whether they were less fatigued or not.

The international literature review indicated that chronic back problems are common with many truck drivers. Over half of the drivers surveyed did not have back problems. Of those drivers who did have back problems 35% said that CTI helped to reduce their back problems. The remainder (65%) said it had no effect on their back problems.

The international literature review indicated that driver safety may be improved with CTI as a result of fewer tyre failures, better vehicle control, better braking abilities and reduced stopping distances in emergencies, and fewer failed climbs and related back-downs. Some drivers (14%) did not think that CTI improved safety. A few (4%) did not know if CTI improved safety or not. Most of the drivers surveyed (82%), however, believed that driver safety was improved with CTI. The number one reason given by drivers for improved safety was “there are fewer failed climbs and there is less need for backing down a slope that the truck could not climb”. Other reasons given included: “less tyre wear, damage and failures”, “better traction, particularly on wet mud and steep roads”, “better truck control”, “improved comfort”, and “if you get a slow leak in a tyre you can get home at night to repair it”.

The international literature review indicated that truck stability and cornering can be affected by tyre pressures. There was not a clear consensus on this issue from the drivers surveyed. A third (38%) believed that CTI improved stability and cornering, a third (35%) thought it had no effect, and a fifth (17%) thought it made stability and cornering worse. The remainder (10%) did not know if it had an effect or not. Some drivers noted that it is “worse if you forget to pump the tyres up when loaded and then drive at normal speeds on sealed roads”.

The international literature review indicated that improvements in traction and mobility have been reported for trucks using CTI systems. There was a clear consensus on this issue. ALL of the drivers surveyed said that traction and mobility are improved with CTI. Many examples were provided of how improvements in traction and mobility have helped them in their driving. These include:

- “good traction saves time – not stuck as often”
- “holds the road better and reduces wheel spin”
- “it stops you getting stuck with all the problems that come with that”

- “driving is less stressful, you know you are going to get out of sticky places”
- “never need assistance to get out of difficult places”
- “less time getting stuck on soft terrain with no rock on the roads”
- “areas where trucks with no CTI get stuck, I can get out of. Drop the pressure and away I go”
- “CTI has helped me a lot in difficult places”
- “when roads are soft and wet more tyre on the ground certainly improves traction”
- “I got to a site that another truck [without CTI] could not – and out again!”
- “I can get into and out of wet, muddy skidsites”
- “taking off from muddy skidsites and climbing steep forestry roads is easier”
- “by fully understanding how the system works, not being scared of it, that is letting tyres down to the lowest setting and taking your time you can get out of places that you could not have otherwise”.



CTI is brilliant when you have to pull away from skids straight uphill



The international literature review indicated that improvements in grade climbing ability have been reported for trucks using CTI systems. Over four-fifths (86%) of the drivers surveyed said that their grade climbing ability is improved in trucks fitted with CTI. One driver thought there was no improvement. The remaining drivers did not know if there was an improvement or not. Not all drivers who said there was an improvement were able to quantify how much steeper grade could be climbed. For those who were able to quantify it, the average increase in grade was between 6 and 7%. The range was from 1% increase in grade to greater than 7% increase. Many examples were provided of how improvements in grade climbing ability have helped them in their driving. These include:

- “without Bigfoot the road was too steep – with Bigfoot no problems”
- “less downtime because of not having to be pushed up the hill”
- “less damage to the truck – less towing needed”
- “other trucks can’t get out of areas I can. I do woodlots – CTI is awesome in paddocks, etc.”
- “it isn’t so hard on the drive train under climbing conditions”
- “I got stuck when I forgot to drop air. I backed down, dropped air and then drove out”
- “less stress about getting stuck”
- “CTI is brilliant when you have to pull away from skids straight uphill”
- “when you put in the right gear for climbing and have the right tyre pressures it helps keep the vehicle moving”
- “it is safer and you have better control on steep slopes”
- “with CTI I can get out of most places – if I couldn’t lower my tyre pressures I would be stuck”.

The international literature review indicated that higher operating speeds, particularly over rougher terrain, have been reported for trucks fitted with CTI systems. This can lead to improved trucking productivity (= more loads per day). Over half (56%) of the drivers surveyed thought that CTI did not lead to higher operating speeds. Many said that they “drive to the conditions” and that “high speeds on rough roads were hard on the gear”. A quarter (27%) of the drivers said that CTI did lead to increased travel speeds. A small portion (10%) of the drivers thought it reduced travel speeds. The remainder (5%) did not know if it affected travel speeds or not.

The international literature review indicated that reduced downtime, due to vehicles getting stuck, shock and vibration equipment failures, and punctures, has been reported for trucks fitted with CTI systems. This can lead to improved trucking productivity. The vast majority (82%) of the drivers surveyed said that CTI systems led to reduced downtime. A small portion (14%) said CTI had no effect on downtime. The remainder (4%) did not know if it affected downtime or not.

The international literature review indicated that greater gross payloads have been reported for trucks fitted with CTI systems due to greater mobility on soft soils and steep grades. This can lead to improved trucking productivity. Over half of the drivers surveyed (53%) did not believe that gross payloads were increased with CTI. A third of drivers (35%) thought CTI did result in increases in their payload. One driver thought it led to a reduced gross payload and the remainder (10%) did not know if it affected their payload or not.

The international literature review indicated that an increased operating season, due to improvements in mobility and reduced impacts on private and public roads, has been reported for trucks fitted with CTI systems in some regions of the world. Over half of the drivers surveyed (56%) said that CTI systems increased their operating season. Some of these drivers said that without CTI they would not be able to get into some sites. A third (29%) said it did not increase their operating season. The remainder (15%) thought that this issue was not applicable to them.

The drivers were asked how easy it is to use CTI systems. All drivers indicated that it was either “very easy” (96%) or “moderately easy” to use CTI systems.

The international literature review indicated that some drivers claim they have much more confidence that when their vehicle is fitted with CTI they will be able to get to the site, pick up the load, get out again and deliver it to the customer. Almost all drivers surveyed either “wholeheartedly agreed” (70%) or “partially agreed” (26%) with this claim. One driver “wholeheartedly disagreed” and one driver “neither agreed nor disagreed” with this claim.

The surveyed drivers were asked how willing they would be to go back to driving trucks not fitted with CTI systems. Over four-fifths of the drivers surveyed were either “very unwilling” (55%) or “partially unwilling” (27%) to go back to driving trucks not fitted with CTI systems. A few drivers (6%) were “very willing” and the remainder (12%) was “neither willing nor unwilling” to go back to non-CTI trucks.

The surveyed drivers were asked what they believed the disadvantages were to fitting and using CTI systems on trucks. The number one disadvantage given by drivers was “forgetting to turn off the taps at night and ending up with flat tyres”. Other disadvantages included the following:

- “it is something else that can break down”
- “changing tyres is a problem”
- “tyre companies moan when you pull up to fix a puncture”
- “tyres get hammered” and “tyres peeling off the bead”
- “tyres leak more often”
- “if have a blow-out have to replace a hose”
- “hoses and fittings outside the wheel can be in the firing line for damage”
- “cost, but it is not exorbitant anyway”
- “some CTI systems are difficult to get accustomed to (e.g. TRT). Bigfoot is the best.”
- “there are no disadvantages as long as it is working”
- “occasional monitor failures” – [this truck was fitted with a Bigfoot system]
- “occasional wiring issues” – [this truck was fitted with a Bigfoot system]

Surveyed drivers were given the opportunity to make any additional comments that they wanted to. Additional comments included the following:

- “All trucks should be fitted with CTI”
- “With CTI I can get the job done with confidence”
- “Bigfoot has been good to deal with for parts, etc.”
- “Great idea”,
- “All off road logging trucks should have this – it is better for roads”.
- “CTI is safer”
- “When RFH initially fitted CTI to a few trucks they were sent to all the difficult jobs. Their drivers therefore got the worst jobs. Nobody wanted to drive those trucks.”
- “I would not go off-road without it now”
- “I have had to change my practices to get the best from CTI without damaging the tyres”
- “Would not go back – fantastic”
- “Wouldn’t do without it – great advantages on steep grades, or muddy, slippery conditions”
- “CTI is over-rated” – [this driver responded negatively to all questions on the survey form, other than agreeing that traction was improved.”
- “Good tool to have on the truck – one of the most important”
- “Brilliant idea”
- “A great, effective system”
- “I would never do without CTI now. I rely heavily on it”
- “Without CTI I would have trouble getting into and out of the forest block”



3.4 Survey Results: Land Owners

The forest companies that responded to the survey were: Timberlands, Rayonier/Matariki, Ernslaw One, Pan Pac Forest Products, Hikurangi Forest Farms, Wenita, Blakely Pacific, Forest Enterprises, and City Forests. All forest companies were located within New Zealand.

Log hauling was the main activity on roads for all nine companies. Two-thirds of the companies also listed gravel cartage as a main activity. All companies indicated that their roads were mainly unsealed.

The international literature review carried out in 2016 indicated that some land owners report savings in road maintenance costs when trucks fitted with CTI systems are used on their roads.

Nearly 90% of surveyed land owners reported that their road maintenance costs were “slightly better” (44%) or “much better” (44%) compared with no CTI. The remaining 12% of land owners indicated that maintenance costs were “the same”. One land owner noted that not all trucks entering its forests had CTI fitted, and those that did only had CTI fitted to the drive axles.

The international literature review indicated that some land owners report savings in road construction costs when trucks fitted with CTI systems are used on their roads. 44% of surveyed land owners reported that their road construction costs were “slightly better” compared with no CTI. Another 44% indicated that construction costs were “the same”. The remaining 12% of land owners did not know if they were better, the same, or worse. One land owner noted that it constructs its roads on the assumption that non-CTI trucks may be using them as well as CTI trucks.

The international literature review indicated that an increased operating season, due to improvements in mobility and reduced impacts on private and public roads, has been reported for trucks fitted with CTI systems in some regions of the world.

Extended operating seasons give land owners the

opportunity to better utilize equipment, meet their customers’ supply requirements over a less concentrated time horizon, and obtain more revenue. A third of surveyed land owners reported that their operating season increased compared with no CTI. Another 45% indicated that it was “the same”. The remaining 22% considered that the question was not applicable to them.

The international literature review indicated that reducing environmental impacts, particularly reductions in sediment production, is another reported benefit from using appropriate tyre pressures and CTI systems on unsealed roads.

Most of the surveyed land owners (67%) did not know if CTI systems led to reduced environmental impacts on their lands. 11% thought it reduced sediment production (mainly as a result of less road failures), while 22% thought it had no effect.

The international literature review indicated that better mobility and traction of vehicles using CTI on un-paved roads allows road designers greater flexibility to build steeper grades. This allows the road builder avoid potentially landslide prone areas. Most of the surveyed land owners (67%) agreed that using trucks fitted with CTI systems gave them greater flexibility in road location. One commented that CTI was particularly important for traction when trucks have to pull off of skids onto steep adverse grades. The remaining land owners (33%) thought it had no effect on their road locations. Again some noted that not all trucks entering their forest are fitted with CTI and they design their roads accordingly.

The international literature review indicated that better mobility and traction of vehicles using CTI on un-paved roads also allows harvest planners to locate forest landings on steep terrain in more favourable positions for cable logging operations.

This can lead to more productive, lower cost and safer forest operations. A little over half of the surveyed land owners (56%) thought that CTI systems led to improved harvesting operations. 22% thought it had no effect. The remainder (22%) did not know if it made any difference to their

harvest operations. One land owner noted that CTI definitely improved their harvesting operations when they were trucking wood across paddocks from woodlots.

The international literature review indicated that faster travel speeds on unpaved roads, less downtime and increased payloads have been reported in some regions of the world for trucks fitted with CTI systems. These improvements can lead to increases in transport productivity. Only one land owner (11%) thought that transport productivity was improved. That company thought that productivity was improved by about 10%. The remaining land owners either thought that CTI had no effect on transport productivity (56%) or did not know if it had an effect (33%). One respondent commented that, improvements in transport productivity due to CTI may be masked by other changes in the transport sector, such as the introduction of 50MAX trucks and other HPMV trucks.

The international literature review indicated that driver safety is improved with CTI as a result of fewer tyre failures, better vehicle control, better braking abilities and reduced stopping distances in emergencies, and fewer failed climbs and related back-downs. Over three-quarters (78%) of the surveyed land owners thought that CTI improved driver safety. The remainder (22%) did not know if it improved driver safety or not.

The land owners considered the following were ideal conditions for use of CTI systems on their lands:

- On wet areas where extra traction was needed
- On “steep” adverse grades (> 12.5% on straight sections, or > 10% on switch-back corners)
- On sites where access is marginal, “traction issues are magnified for 50MAX trucks”
- During wetter seasons
- On weaker pavements or where poor rock quality is a major restrictor.

The land owners considered the following to be impediments to greater use of CTI systems on their lands:

- “Most of the estate does not need it”
- “Costs vs benefits to the truck owners”
- “Some small operators have trouble financing the equipment”
- “Drivers not knowing or caring about the benefits to the forest owners”
- “Driver perception or skill. Not all drivers are willing to use it, even if it is on the truck”
- “Need to convert the whole fleet to CTI before the land owner can realize all of the benefits.”

It should be noted that some land owners considered that there were no impediments since it was mandatory for their forests.

The land owners were invited to make any additional comments that they would like. These included the following:

- “CTI can be easily overdone and should not be an excuse for bad road design”
- “CTI should only be applied to steep, difficult sections of the forest”
- “Greater use of CTI-equipped HPMV’s has probably blurred the lines a bit with regards to [reductions in] pavement damage”
- “Our cartage guys all use CTI. Not having CTI would create problems”
- “CTI is compulsory for all our log cartage contractors and metal trucks. The biggest problem is enforcing that it is used”
- “CTI is a great system”.



6. Summary and Implications for BIGFOOT

While it took considerably more effort than expected to gather survey data, much material was obtained from the 75 completed survey forms. This will be useful for marketing of BIGFOOT's current CTI systems and perhaps for enhancing/developing new CTI systems for BIGFOOT.

For some matters covered in the surveys, there was strong agreement between the respondents and positive support for CTI.

- All truck owners and all truck drivers said that CTI improves traction and mobility.
- The vast majority of owners and of drivers said that CTI improves their grade climbing ability. The average improvement was a 5% increase in grade.
- Nearly all drivers said that CTI gives them greater confidence that they will be able to get into the site and out again without assistance from other equipment.
- Nearly all of the drivers said that the ride was better and it reduced vibration at their driver's seat.
- All truck owners and over 80% of the drivers said that CTI reduces their downtime.
- Most of the drivers and forest owners said that CTI improved driver safety.
- All drivers said that CTI was easy to use.
- A large majority of drivers said that they would be unwilling to go back to driving a non-CTI truck.
- Almost all of the truck owners said that CTI systems were reliable.
- Over half of the truck owners and half of the truck drivers thought that having CTI gave them a longer operating season.

For some issues there was either no clear consensus between the respondents or CTI was thought to have little or no benefit.

- Truck owners did not believe it was easier to recruit and retain drivers when trucks were fitted with CTI.
- There were mixed opinions on whether CTI improved vehicle speeds on rough terrain.
- Most owners and drivers said that CTI did not lead to greater payloads. However, a quarter of truck owners and a third of truck drivers did believe that it improved their payloads.
- Most of the drivers said CTI did not reduce their back problems – many drivers did not have back problems anyway.
- Slightly over half of the drivers said CTI did not make them less fatigued at the end of the day.
- There was no clear consensus on whether CTI affected truck stability and cornering.

The most frequently stated reasons, in order of highest frequency, that truck owners gave for fitting CTI to their trucks were (1) because it was required in their contracts, (2) because it made their operations more productive, and (3) because it led to reductions in operating costs.

Most of the truck owners had difficulty quantifying some of the benefits of CTI. Those that could quantify the benefits, indicated, for example;

- That the average payback period for CTI was a little over 3 years
- That average vibration-related repairs were reduced by about 27%
- That average vehicle life was improved by about 29%
- That average tyre wear was reduced by about 18%,
- That the operating season was extended by about 3 to 5 days, and
- That, on average, there was no change in fuel consumption. Since fuel is a significant cost for trucker owners, this issue deserves more detailed investigation. The Tire Boss web-site, for example, claims that better tyre pressure control leads to fuel cost savings of 3 to 4%.

Although half of the truck owners thought that CTI led to improvements in transport productivity, forest owners thought that CTI had no effect on productivity. There was also no clear consensus from forest owners on whether or not CTI led to improvements in harvesting productivity.

Forest owners thought that CTI led to (a) reductions in road maintenance costs, (b) greater flexibility in road design, (c) road construction costs that were the same or slightly lower, and (d) an operating season that was the same or slightly longer than attainable with non-CTI trucks.

The surveys provided a long list (>60) of positive comments that BIGFOOT could use to promote the benefits of CTI in general, of its CTI systems in particular, and its service to customers. These could be used as a potential source for endorsements for the BIGFOOT system.

As noted earlier in this report, the number one reason that truck owners give for fitting CTI to their trucks is that it was required in their contracts.

They later start to identify the productivity and cost savings benefits for them. BIGFOOT should see promotion of the benefits of CTI to external stakeholders as an opportunity to expand their business. Promoting the benefits of CTI to regional roading authorities (nationally and internationally), forest owners and other land owners should be included in BIGFOOT's marketing strategy.

BIGFOOT's website could be improved by better reflecting the range of industries it serves (i.e. broader than forestry) and its international footprint, by the use of endorsements to sell the benefits of its systems, and by the provision of tools to help both its potential customers and existing customers realize the benefits of CTI.

BIGFOOT may be the largest provider of CTI systems in New Zealand. Phase 2 of this project has identified, however, that opportunities exist for it to grow its market share nationally and internationally through the provision of new features, tools, and information for its customers and an improved marketing strategy.



Notes:



To learn more about the Bigfoot Central Tyre Inflation System visit:

bigfoot.co.nz