

## On-The-Go Tire Pressure Adjustment for Manure Tankers

### Purpose:

The purpose of this project was to investigate automatic tire inflation systems for use on manure tankers in Ontario and to assemble a prototype tanker for testing the functionality of the system. In addition, soil compaction and crop response experiments are being conducted to evaluate the potential impact of field-edge inflation pressure adjustment on compaction risk and crop productivity.

### Methods:

Visits were made to manure tanker manufacturers, soil scientists and tire inflation system manufacturers in Europe to investigate practical options, technology and costs.

Working with Kraayenbrink Farms and Nuhn Industries a tanker was obtained to install a complete air inflation system and radial tires. The decision was made to source the equipment from North America. TPC International from Edmonton was contracted to install their inflation control system. A compressor and hydraulic motor was sourced locally and Michelin 850 50 R 30.5 tires were used for the tanker.

Although in Europe the majority of the factory installations are done by delivering the air to the hub by drilling holes through the axles we opted to bring the air through external lines mounted on the side of the tanker (see Figure 1).

Tires are normally inflated to about 1.6 – 2.0 bar (22 - 28 psi) for road travel and deflated to about 1 bar (14 psi) in the field. This range depends on the tire specifications, travel speed and the weight that needs to be carried by the tire. Table 1 contains the specifications for the tires used in this project.

**Table 1. Specifications for the Michelin CargoXBIB tire (850/50R30.5 TL 182D) used in this project.**

Inflation Pressure	Travel Speed			
	5 mph	15 mph	25 mph	30 mph
	Load Capacity (lbs/tire)			
14 psi	14,180	11,840	10,190	9,060
17 psi	15,750	13,310	11,440	10,190
23 psi	18,900	16,230	13,970	12,420
29 psi	22,040	19,150	16,480	14,670

In fall 2010, a field study was set up with treatments which included fall and/or spring tillage, tanker traffic that occurs in either the fall or spring and tanker tire inflation pressure that was set at both minimum (14 PSI) suitable for field speeds and maximum (28 PSI) suitable for road speeds. The research plots allow for measurement of soil compaction and crop response over the next two years of the project.

**Results:**

The completed tanker is illustrated in Figure 1. Several key issues still remain to be investigated as the project team evaluates the system components:

Deflation time: some adjustment still needs to be made to reduce deflation times, currently they are longer than 2 minutes and the target is approximately 30 seconds.

System costs: the relatively low cost of manure tankers in Ontario compared to Europe puts additional pressure on trying to develop an inflation system that is significantly lower in cost than most of the European models. Further work on this front will be explored in the remainder of the project.

**Figure 1: The project tanker complete with compressor, airlines and control system**



**Summary and Next Steps:**

The tire pressure adjustment system is operational. In 2011, field trials on how tire inflation pressure affects soil compaction and yield will continue. Ongoing investigations into system efficiencies and reducing the costs of the system will also be part of this project.

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