

## Press wheels

### Introduction

This document has been prepared by Manutec for use by farmers to assist them in selecting the best press wheels for their circumstances. The information in this document is a combination of practical experience and scientific research. Scientific basis comes from a variety of research documents produced by the government agricultural research agencies of SA, WA, VIC, NSW and QLD and the practical from over 20 years of manufacturing and developing press wheels.

The use of press wheels is an important step in increasing efficiency and durability of seed emergence. Used correctly they can typically increase emergence by 10% to 25% as well as improving seedling durability. Tyre pressure over the seed trench gives better seed soil contact, reduces the speed of soil drying, maximises moisture availability and helps to optimise use of existing sub soil moisture.

Advantages of press wheels are:

- Increased seed soil contact.
- Moisture maximisation.
- Increased local soil compaction, which restricts insect movement and consequent damage to seed and seedling.
- Reduced emergence depth by decreasing the distance between the seed and seedbed surface.
- Allows a range of point/boot/wheel combinations
- More uniform soil coverage across the width of a planting machine is ensured.
- The seed furrow is closed to prevent surface light penetration, particularly on heavier soils. This can cause premature sub surface leaf emergence.
- Smaller falls of rain are concentrated into the seed furrow, thereby promoting faster secondary root development.

Many of Manutec's customers also report a wider range of local advantages that they have found when using press wheels.

There is also a counter argument from some farmers that press wheels don't work, this number is reducing each year however often this argument is developed after a bad experience. Often the assembly or the whole press wheel concept will be blamed, when really the problem was that the press system used was not designed to work in the conditions that it was being used in. Often simply by changing the tyre shape or composition a completely different result can be achieved. One of the advantages of the Manutec system is that we do not believe in a one system fits all farming scenarios and we try to tailor our product for each customer. Even if for whatever reason the first solution may not be the best it is relatively easy to fine tune system with a different tyre. So it is important to talk to us and your neighbour's before making your final decision. Be wary of the manufacturer that promises a one solution fits all solution, because it doesn't exist.

In a no-till/direct drill or disc seeder planting situation press wheels are essential in most soil types, however the behaviour of the press wheel will vary considerably. The decisions and thought process involved in choosing and setting up press wheels is very important. The wrong decision can prove to be costly both in terms of equipment cost but also in terms of benefits in increased yield. When buying equipment fitted with press wheels, do not leave this decision up to the dealer or manufacturer unless they have considerable experience with what works in the area concerned. Also when buying secondhand equipment with press wheels fitted that originates from another area, don't expect that it is going to work in your conditions without some alterations. Again please call us for advice.

Before choosing the press wheel, it is important to consider the following list of factors, each of these factors will have a range of implications and by going through each factor, different wheels can be ruled in or out.

- Soil Type
  - Sand, loam, self wetting, self mulching, clay (red, grey, black)
  - Prevalence of Rock
  - Abrasiveness to rubber
  - Amount of top soil
  - Tendency to Clod
  - Worked or unworked
- Typical Rainfall during germination/establishment period
- Existing soil moisture and depth of sub soil moisture
- Type and width of point
- Seeding Method
  - Single row, split row, spread row
  - Row Spacing
  - Speed
  - Dry sow, wet sow or both
  - Tramline (up and back), round and round or both
  - Tine or disc
- Crop Type
  - Small, medium or large seed
  - Pressure sensitive
  - Depth Sensitive
- Next year crop/stock rotation

- Fallow
- Sheep
- Cattle
- Same/different crop
- Trash Levels
- Machine Type
  - Hydraulic Lift
  - Weight Sensitivity
  - Inframe and Under Frame Clearances
  - Breakout type and pressure
  - Tyne Layout
  - Obstructions (wheels, cross members, hydraulics)
  - Air Cart/Seed Box position (Front/Top/Behind)

Manutec can help to go through all of these issues and answer any questions that you may need answers to.

### **Tyre Shape/Profile**

The shape of the press wheel tyre will depend on a number of the above factors, the most common shapes and the characteristics of each are below. Note that it is important that the decision process regarding the points to be used is also done in conjunction with the press wheel selection process.

### **Broad/medium Wedge (3" -80mm overall width, 1" flat tip)**



- Available in Hi-Flex, Semi-Pneumatic, Semi-Solid and Full Solid Rubber
- Available in 15",16" and 18" diameters
- Used extensively in most regions where mixed soils, mixed crops and varied rainfall is the norm
- Good moisture seeking and moisture harvesting properties
- Good depth control in medium to light soil structures
- Good all purpose profile gives a good balance between seed soil contact and moisture harvest
- Ideal for single narrow row seeding

- Good tracking characteristics
- Above average wear and durability (Semi-Pneumatic variant)
- Average to good mud shedding capability (Semi-Pneumatic and Hi-Flex variants)
- Good wear and durability (Solid and Semi-Solid Variants)
- High pressure tyre
- Good for mixed condition and mixed crop farming.
- Will give a good to average result in most conditions
- Tendency to leave paddocks rough
- All regions – very widespread
- Semi-Solid variant used extensively in disc machines

**Wide Flat (sometimes referred to as square) (4"-100mm and 5"-120mm overall width)**



- Available in Hi-Flex, Semi-Pneumatic and Solid Rubber in 4" and 5" widths
- Available in 15" and 18" diameters
- More common in areas of above average rainfall or in sandy soils
- Very good seed soil contact
- Good depth control in medium to light and sandy soil structures
- Good scattering of loose soil above pressed seed.
- Ideal for spread row or split seeding
- Good mud shedding capability (Semi-Pneumatic variant)
- Very Good mud shedding capability (Hi-Flex variant)
- Average wear and durability (Semi-Pneumatic variant)
- Good wear and durability (Solid Variant)
- Low pressure tyre
- Does not handle "cloddy" soil well
- Can shoulder out in some conditions
- Doesn't leave paddocks rough
- Good for canola and other small seeds

- Regions – Northern WA, Eastern and Central Victoria. Hi-Flex version very popular in Clermont (QLD)

### **Rounded (3"-75mm and 4"-100mm overall width)**



- Available in Hi-Flex (4" – 100mm), Semi-Pneumatic (3" -75mm and 4"-100mm), Semi-Solid (4"-100mm) and Solid (3.5"-90mm) rubber.
- Available in 15" and 16" diameters.
- Used as a trade off (half way) between wedge and flat profiles
- Properties similar but not as pronounced as compared to the wedge and flat
- Medium Pressure Tyre
- Semi-Pneumatic handles sticky soils well and has medium durability
- Solid has very good durability
- Regions – Semi-Pneumatic Central Victoria, Solid and Semi-Solid West Coast SA and WA
- 4" version very popular on JD1870 machines

### **Wide Wedge (4" -110mm overall width, 1.5" flat tip)**



- Available in Semi-Pneumatic and Solid Rubber.
- Available in 15" and 18" diameters
- Above average moisture harvesting properties
- Good depth control in light and sandy soil structures
- Good all purpose profile gives a good balance between seed soil contact and moisture harvest
- Good for spread and split row seeding where some moisture harvesting is required
- Will help to reduce sidewall collapse in Sandy Soils
- Good tracking characteristics
- Above Average wear and durability
- Low pressure tyre
- Average to good mud shedding capability

- Popular for use with Stiletto and Rootboot seeding systems
- Does not handle "cloddy" soil well
- Will not leave paddocks as rough as the 3" wedge
- May shoulder out in heavy soils or behind some knife points.
- Good for smaller seeds
- May require ticklers/snake chain to give some soil scatter over pressed seed
- Regions SA Mallee, SA West Coast, Central and Northern WA

**Narrow Wedge (2"-55mm overall width, 3/4" flat tip)**



- Available in Semi-Pneumatic, Semi-Solid and Solid rubber
- Available in 15" and 18" diameters
- Used extensively in NSW and QLD
- Very Good moisture seeking and moisture harvesting properties
- Good depth control in heavy soil structures
- Poor depth control in light soil structures
- Good seed soil contact when drilling deep with narrow tyre
- Good for cereal and larger seeds.
- Ideal for single narrow row seeding
- Good tracking characteristics
- Semi-Pneumatic has Average to low wear and durability, solid has very good durability
- Semi-Pneumatic has good mud shedding capability, but the solid does not
- Semi-Pneumatic doesn't handle dry seeding very well, but the solid does
- High pressure tyre
- Tendency to leave paddocks rough
- Regions Southern Queensland and Northern NSW
- Used for deep drilling into moisture.

**Medium and Narrow Flat (sometimes referred to as square) (2"-55mm and 3" - 80mm overall width)**



- Available in Semi-Pneumatic, Semi-Solid and Solid rubber
- Available in 15" and 18" diameters
- More common in areas of above average rainfall
- Very good seed soil contact
- Good depth control in medium to light and sandy soil structures
- Good scattering of loose soil above pressed seed.
- Semi-Pneumatic has very Good mud shedding capability, handles clay very well
- Semi-Pneumatic has Average to Low wear and durability, does not like dry seeding.
- Solid has good wear and durability, but does not handle the sticky soils as well.
- Low to Medium pressure tyre
- Does not handle "cloddy" soil well
- Doesn't leave paddocks rough
- Regions Southern Queensland and Central Northern NSW

**Other Tyre Profiles**

- Narrow Dome/vee (2")
- Ribbed (3")
- Broad Dome/Vee (3")
- Gauge Wheels

**Tyre Diameter**

Often we get asked why we have all of the different diameters, really it is history. When press wheels first started being used in a particular region, generally that size was then adopted by other farmers in the same region. Hence today we still see a concentration of the same wheel size in unique regional areas. After many years of use it is now easier to quantify the advantages of each wheel size. The main trend that we are seeing however is increased land area that is being cropped by the average farmer and increased amounts of dry seeding. Coupled with this is a culture of less time to spend on maintenance. As a result wheels are now required to do more work, in harder conditions and with less maintenance than was the case 10 years ago. With this trend the bigger wheels start to show advantage over the smaller ones because they give improved durability.

The tyre diameter used can be an important factor in areas where tyre performance is marginal. A larger diameter tyre may give better cleaning as the rubber will flex more. Some customers also like the larger rolling diameter as it will increase the mean time between failures of components such as bearings and tyres. In situations where a higher than normal pressure is required the larger diameter may help due mainly to its increased weight and in high trash environments the larger diameter may improve trash flow, by increasing the ground clearance of trash collecting parts such as frames and axles. Diameter is not normally a critical factor, however anecdotal evidence from customers is that the bigger diameter wheels perform better and are lower maintenance.

Additionally we are seeing an increase in the amount of deep drilling into moisture, particularly in NSW. The bigger diameter wheels with the narrow tyres will allow the wheel to be able to run at depth without the seal being dragged through the dirt.

Manutec does a range of tyre diameters, these are broken down in three nominal sizes, 15", 16" and 18". When we talk about diameter of the wheel we always refer to the nominal outer diameter of the tyre. The 15" and 16" tyres both fit onto the standard 15" rim, the actual rim diameter is about 12", ie they are interchangeable with each other. The 16" tyres have an additional half inch of rubber all way round, which may improve cleanability (semi-pneumatic variants) and wearability (solid variants). The 18" tyre/wheel has a different rim size and the rim is about 15" in diameter. This can be confusing to some. The main use of the 16" tyres is on Conservapak and JD1870 machines.

## **Tyre Material and Composition**

The tyre material and composition chosen will depend on three main factors;

- Soil Stickiness
- Durability
- Soil/Rubber abrasion

The most common material is a softer more flexible compound in a semi-pneumatic tyre that gives the tyre a good self cleaning capability and reduces the need considerably to use scrapers. This material is however not as durable and will not handle stone, wire, wood as well as harder compounds, this material will also wear out at a faster rate. The final decision is almost always a trade off as most farms have a wide cross section of soils, rock, clay that needs to be dealt with. Generally the trend is toward the softer tyre as the mud and clay is often considered the factor that dominates choice. Expect an average of 10% tyre wear/replacement per year if using semi-pneumatic tyres. This will vary depending on acreage and soil abrasiveness.

Traditionally the harder material in a solid tyre was favoured, however in recent years this has changed considerably with many farmers changing from hard solid tyres to the soft semi-pneumatic ones. If however durability is the predominant factor then hard tyres should be used. Scrapers will most likely be required.

The trend for 50% of the crop to be dry sewn and the remainder wet sewn creates a further dilemma as ideally a hard tyre should be used for the dry sew and a soft semi-pneumatic tyre for the wet sew. This is because dry sewing is much harder overall on all machine components including the press wheel tyres and soil build up should not be a problem. This gives four possible options for the farmer.

- Hard Tyre (Scrapers in heavy wet conditions)



- Soft Tyre (Wear tyres out quickly due to dry sewing)
- Two sets of tyres – hard and soft (Ideal Scenario)
- Semi-Solid Tyre

The Semi-Solid tyre is a trade off where the softer material is used and the wall thickness more than doubled. This is used extensively behind disc machines where the tyre is used more for closing than pressing and in areas of high rubber abrasion (Grey and Black Soils). It is not normally recommended as it is an in between material that will not produce the best result in either hard or soft conditions. The farmer should also consider carefully in what order paddocks sewn, taking into account the varying soil structures and moisture levels.

For extreme sticky conditions we do a Hi-Flex tyre, which is very soft and designed to give the maximum level of cleanability in clay soils. This tyre should never be used in dry or rough conditions. This tyre is a "get out of jail" tyre for parallelogram machines if the season has a wet start and the fitted tyres aren't coping. The 100mm Hi-flex tyre has become very popular around Clermont (QLD- Sticky Sealing Clays) as it both copes with the extremely sticky soils as well as providing a low pressure press to reduce the opportunity for the clay soils to compact too much over the seed.

Many farmers do not like the idea of two sets of tyres or wheels because of the cost. For a 50 tyne machine the average cost of a second set of tyres is \$3000 and the time taken to change the tyres is about 3 hours. Alternatively a second set of wheels would cost on average about \$7000 and in most cases these could be replaced in about 2 hours. A second set will however result in lower costs, a better result and less down time.

## **Tyre Pressure**

There are many variables to consider when setting pressure and while several rule of thumb are available, setting for your own conditions at the time of planting is the most reliable. Recommended pressure should be between 2 and 4 kg per cm of tyre face, use the notes below to help determine optimum.

Optimum press wheel pressure depends on soil type, soil moisture level at planting, crop type and time of planting. Generally lower pressures are used in wet soils and pressure increased for drier planting. Lower pressures are required in lighter sandier soils than heavier clays. As a result it may be a requirement to vary pressures for different areas on the same property, particularly if heavy clays and sandy soil are both present.

Most importantly the press wheel must close the planting slot. If you inspect the job and can see seed in the bottom of the trench then the press wheel is not doing its job. This scenario can occur in very puggy wet clay soil types. You either have to increase press wheel pressure or change to a more aggressive tyne point or a combination of both. After that criterion is satisfied (trench closed) then the next test is the seed has to finish up into firmed moist soil and for most seeds about 20-25 mm below the press wheel mark. A layer of loose soil on top of the press wheel track will assist in preserving moisture and preventing the tyre track from setting herd. Some soils will flow naturally or be assisted by following with ticklers or lengths of chain (snake chain).

Always check your calculated weight with the press wheels in the paddock at the intended working depth, this can be done with a spring scale or a set of bathroom scales. If the trench is properly closed then ease the pressure off, particularly for sensitive seeds. This will reduce the load on tyres, bearings and other components.

Pressures at the higher end of the recommended ranges should be used when:

- Zero till planting into sticky clay soils.
- Soil moisture is marginal and planting depth must be increased.
- High soil insect population exists.

Pressure at the lower end of the recommended ranges should be used on poorly structured soils with hard setting characteristics. Too much consolidation of soil over the row may impede the emergence of the young shoot as well as causing surface crusting.

Many new parallelogram machines are using hydraulic pressure to control the pressure. On most machines this pressure is very high and significantly higher than those recommended above. As a result some of these machines require a hard and wide tyre to be able to absorb the excess pressure. Without this the tyres would "bulldoze" the seed too deep and the tyres would also wear out very quickly, ie the higher the pressure the greater the tyre wear and greater the risk of tyre damage

### **Other Wheels and Tyres**

In addition to standard press wheels Manutec also does a range of Gauge wheels, planter wheels and replacement OEM parts. Below are some of the options, call us for the complete range as we have tyres to suit more than 90% of Australian Agricultural machinery, if we do not have it we may have an alternative or we may be able to make it for you.

- John Deere – Air Hoe Drill Replacement Tyres, Planter Wheel and Gauge Wheel replacement.
- Flexi-Coil/Bourgault/Morris/Ezee-On – Gang Press Wheel Replacement
- DBS – Hi-Flex tyre for use by DBS machines in sticky soils and also a wide thick tyre for use with Stiletto boots/spread seeding on DBS machines.

Manutec has also developed the Mud Razor range of Disc Seeder Gauge wheels that have a scraper built into the face of the tyre and spoked rims. These are very popular on John Deere Single and Double Disc Openers.

### **Purpose Built Wheels and Tyres**

Each year Manutec manufactures tyres and wheels that are designed or "tweaked" specifically for use in an individual farmers conditions or on a particular type of machine. Occasionally these tyres then become a main stream product that we can make available to other farmers in similar circumstances. If the tyres/wheels are not giving the best result, are wearing out too quick, are clogging up with mud, or burying the seed too deep, or some other problem then give Manutec a call in the off season. Normally we can design and manufacture a new tyre in around 3 months. Recent examples of this are new tyres for JD1870, JD1860, JD1890, JD1830, MaxEmerge, Serafin, Morris and DBS machines. We also work closely with a number of Australian and New Zealand Farm Machinery manufacturers to develop wheels for their machines.

### **Hub Type**

There are seven main types of press wheel hub.

- Integral – One piece cast alloy unit with tapered roller bearings (HT) to suit a 40mm round or square stub axle, agricultural grade seal and inbuilt dust cap protection. Narrow hub profile.

**MANUTEC**  
Agricultural Products

- Zero Maintenance Agri-Hubs – A fully sealed, fully assembled hub. No maintenance required for the life of the hub. Repair by replacement. A more expensive option upfront, with maintenance savings over the life of the hub.
- HT – Separate cast steel hub, same bearings and seals as Integral, 40mm round or square stub axle, separate dust cap protector. Wide and Narrow Hub profiles available (Narrow profile uses Integral stub axle). We can also do Ford and BMW patterns if required.
- HT Planter - Separate cast hub (steel and alloy versions available), sealed bearings and seals , 16mm round axle or bolt, separate dust cap protector. Suits our range of planter wheels and John Deere replacement parts.
- Flange Bearing – Wheel designed so that two bolt on flange bearings can be fitted. Can be used as replacement for other flange design press wheels such as Jaenke.
- Sealed Bearing – two sealed roller bearings either with or without locking collars. Bearings available to suit a range of shaft sizes. Normally used with A-Frame design shaft. A version of this is specifically available as a replacement for JD1870 and Conservapak wheels.
- Nylon Bush – Nylon Bush centre to suit either 25mm or 32mm shaft size. Normally used in conjunction with straight through gang shafts running on separate pillow block bearings.

For advice on the most appropriate system to use contact Manutec, 08 8260 2277.

Manutec also

### **Assembly Type**

There are four main types of press wheel assembly.

- Trailing Swivel/Fixed, individual assemblies.
- Trailing Swivel/Fixed, twin assemblies.
- Inframe Swivel/Fixed, individual assemblies.
- Gang Assemblies.
- Fixed, Adjustable and Semi Adjustable Tyne Mounted Assemblies.

For advice on the most appropriate system contact Manutec, 08 8260 2277.

### **Disclaimer**

The nature of press wheels is that they will give very different results across a range of farming techniques, machinery combinations, environmental conditions and soil types. The advice in this document is general in nature and is not to be used as the sole source of information when choosing press wheels. It is strongly advised that this is used in conjunction with either specialist local or practical knowledge to determine the best configuration for individual circumstances. If this is not available then a series of short trials is recommended to give actual performance characteristics in individual conditions.