

## Pipe manufacturing is about to get a shake up!

### Humes invests in new Vibration Technology pipe manufacturing plant

New Zealand was one of the early adopters of the once popular spun pipe making method. We are now one of the few countries left in the world where pipes are made using this technology. Now seen as unsafe, inefficient and environmentally unfriendly, the spun pipe making process has been replaced by processes using dry mixes and vertical casting.

Ten years ago Humes Hamilton plant pioneered a Roller Compacted Pipe (RCP) machine. This machine manufactures pipes vertically using a roller compacting head. All Humes North Island stocks of DN 225 through to DN 600 pipes come from this plant. Over the last 10 years, pipes made using this technology have gained a reputation for quality and performance.

Humes have now developed a purpose build Vibration Technology (VT) plant at Papakura. This technology is commonly used throughout the world and boasts a reputation for producing pipe to the most consistent quality and standard. VT will be used to produce pipes from DN 600 through to DN 3000 and manhole components in the common sizes.

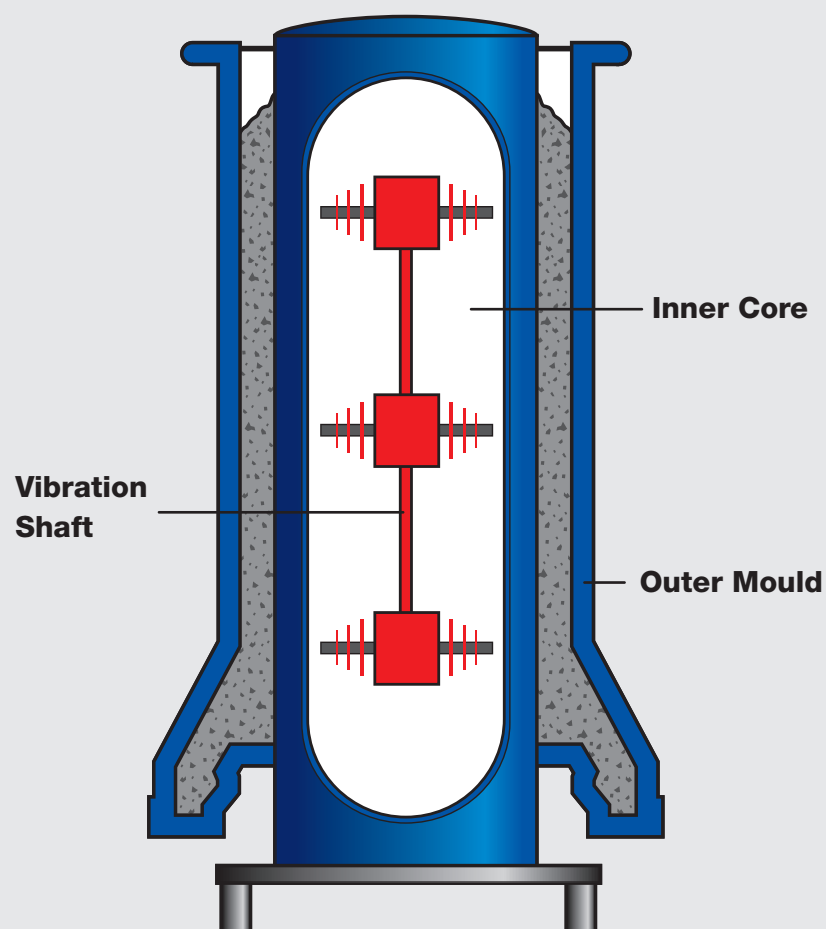
### VT pipes meet all the requirements of AS/NZS 4058:2007 standards

In selecting a new pipe making technology, Humes have made sure that all the requirements of the AS/NZS 4058:2007 and AS/NZS 3725:2007 standards will be met.

Additionally VT pipe comply with many recognised international standards. Most parts of the British and European standards BSEN 1916:2002 and BS 5911-1:2002 were developed around VT technology.



Vibration Setup



VT pipes are made through a vertical casting process. As each pipe is produced a dry mix concrete is placed in the mould and the inner core is vibrated to ensure solid compaction of the concrete.

Spigots are formed by applying a profile ring which ensures a strong, well compacted and accurate casting each time.

The outer mould and pipe is removed from the core and taken directly to the curing area. This means there is a minimum amount of movement of the pipe in the initial casting process.

Pipes are then left in situ for 24 hours for initial curing. Once this is done a full quality control inspection is completed for each pipe before being stored for the remaining curing process.

# The British experience – a case study

Up until approximately 1980, UK pipe was made using a wet (slurry) spun technology as opposed to the drier mix spun technology used in New Zealand and Australia. This method produced a significant amount of waste, and a very messy and hazardous working environment.

The introduction of VT pipe was initially received with a great deal of scepticism, but within a short period VT pipe technology was adopted by all pipe manufacturers in the UK. The pipe was seen as a marked improvement on the current offer and while some markets (the Scottish) lamented the passing of smooth thin bore pipe the majority of customers quickly recognised the additional benefits of high performance VT pipes.

## Are VT pipes different in any way?

Lets be honest, spun pipes look great. The spun process provides a very smooth finish and achieves an excellent crushing strength, despite the thinner wall thickness. But as the rest of the world has discovered over the last 25 years, there is a lot more to be had in a concrete pipe.

### Central Core Vibration

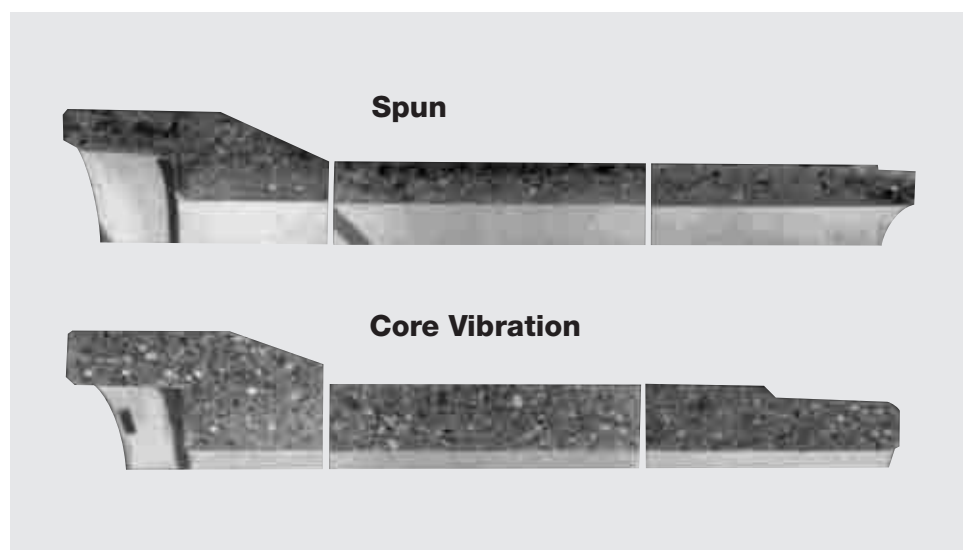
- homogeneous compaction
- uniform material distribution
- uniform crushing strength at jacking surfaces
- uniform concrete at surface – no cosmetic cracking
- no leakage and resulting stoney surface areas
- spigot receives efficient dry cast pressing & compaction

### Spun Pipes

- non uniform compaction
- larger aggregates toward outside, finer sands and light materials at inside surface
- non-uniform crushing strength at jacking surfaces
- tendency to find craze cracks at inner pipe surface
- rough and stoney collar backwalls and seam areas
- thin spigot making it vulnerable to damage

As you can see, the VT pipe is thicker and as a result will weigh more than it's spun counterpart. The distribution of aggregates throughout the pipe is more uniform resulting in increased pipe performance. One automatic benefit of this is that VT pipes will provide a standard cover of 20mm rather than the current 10mm spun option, giving an automatic increase in pipe design life.

VT pipes are not as smooth as spun pipes but they work just the same and meet all the requirements of AS/NZS 4058 standard. VT pipes have thicker and more solid collars and spigots with smaller tolerances allowing consistent and accurate jointing.



# A Change in Pipe Manufacturing Process Means Good News for Concrete Pipe Users

While Humes' new VT pipe making facility will be good for Humes by reducing waste, environmental issues such as slurry and noise and is a much safer way to make pipes, there are a lot of upsides for pipe users. Most positively will be a range of benefits that can only be delivered through the VT manufacturing process.



	Vibration Technology	Spun Pipes
<b>Water cement ratio</b>	Low at approx .34 – .38	High at approx .45. Then spun out to approx .30 - .35
<b>Slumping</b>	No slumping	Slumping with minor pipe variations
<b>Absorption</b>	After 24 hours 3% Less variability in the concrete	After 24 hours 3%
<b>Variability</b>	High and transparent	Higher variability in the concrete
<b>Compressive strength</b>	Compressive strength resulting from low and constant water cement ratio	High compressive strengths but reliant on variable production factors
<b>Wall thickness</b>	Heavier walled pipe providing increased cover and longer design life	Thin walled pipe with lower cover resulting in shorter design life
<b>Capacity</b>	Production of large numbers of pipes possible per day	Only production of small numbers of pipes possible per day
<b>Pipe tolerances</b>	Excellent and consistent tolerance control due to automated process	Variable tolerances determined by operator skill
<b>PE and PVC liners</b>	Both hard and soft lining options using both PE and PVC	Restricted to softer PVC lining options
<b>Liner application</b>	Liners integrated in the manufacturing process	Liners applied through aggressive post pipe manufacturing process
<b>Liner locking system</b>	Can use any liner locking system	Liner applications restricted to vulnerable arrow head compressive applications

# The real advantages of VT pipe

In addition to the quality of pipes and the greatly improved environmental footprint VT provides an unprecedented opportunity to change the way we think about major projects. As the VT pipe making technology gives Humes the potential to make up to 30 pipes a day versus the traditional constraints of spun pipe supply at 2-3 pipes a day project time frames and costs can be vastly reduced by:

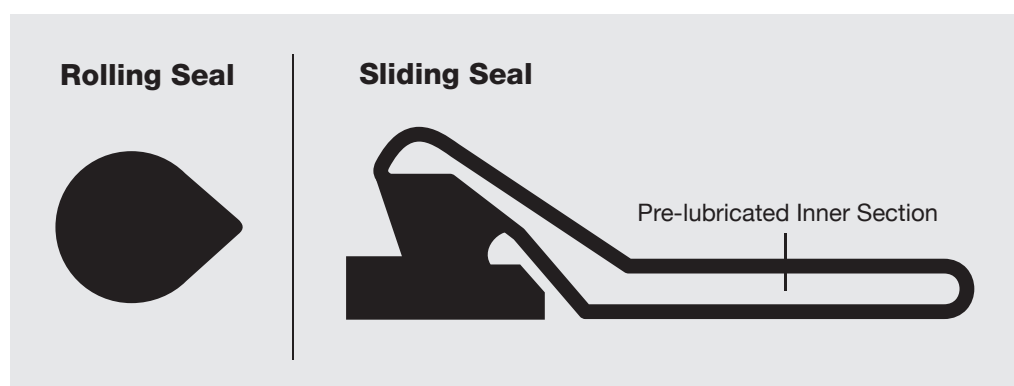
- Having multiple site works underway at any time
- Jobs can be run as a number of contracts or sub contracts
- Increasing productivity by laying more pipes per day
- Laying a standard pipe size to gain cost savings through increased production efficiency
- The ability for the customer to customise the supply schedule with Humes



## Economical lined pipe options now available in New Zealand

VT provides the most economical and consistent ways of producing lined pipe options for aggressive sewer applications. Liner anchors are cast deeply in the pipe structure at the time of manufacture. This process is particularly useful for incorporating thicker more robust PE liners that can withstand the rigors of construction and installation processes. These liners are also easier to weld requiring just one weld instead of three or four welds required with thinner liner applications.

## A better rubber ring jointing solution



As part of the VT technology upgrade Humes have formed a relationship with Forsheda, one of the foremost producers of rubber rings for jointing of concrete pipes. As opposed to the current single option of a rolling ring for RCP and spun pipe, Humes will be introducing a Combination Joint that is at the leading edge of concrete pipe jointing technology.

The Combination Joint provides the opportunity to use a number of rubber ring options from a simple Teardrop Rolling Seal Ring to the revolutionary Sliding Seal Ring. This ring has a sealed pre-lubricated inner section that ensures the ring seals evenly and securely.

In addition there are a multitude of other specialist ring seals for use in a variety of applications such as pressure and sewer. There are also options to have integrated rings that are cast into the pipe during the manufacturing process, requiring no application at the time of installation.



# VT Pipe FAQ's

**What is the design life?**

VT pipes will be made to AS/NZS 4058:2007. The preface of this document discusses expected service life of 100 years for defined "normal" and "marine" environments. This will apply to VT pipe.

**VT pipes look rougher and more porous compared to spun pipe.**

AS/NZS 4058 covers defects permissible to surface of pipe. VT pipes will comply with these requirements. The pipe is not porous and must pass absorption and hydrostatic test requirements.

**Blow holes are common and will reduce cover and design life**

AS/NZS 4058 covers blow hole defects permissible to the surface of pipe. VT pipes will comply with these requirements.

**Will the rougher internal surface affect hydraulic design?**

Pipes made to AS/NZS 4058 have the same design friction factors governed by the operating environment. Refer to the CCAA hydraulic manual for values.

**Will VT be suitable for marine situations?**

Yes. AS/NZS 4058 defines the marine environment and requires 20 min cover, GP cement.

**Will VT be suitable for sewer applications situations?**

Yes the same range of traditional options are available. Lined pipe options will also be available

**Will we be able to join VT to existing spun pipes?**

Only at a manhole.

**What joint types will be available in VT?**

Humes will be introducing a combination RRJ that has the ability to meet a wide range of jointing requirements.

**How real is the ability to supply a lot of pipes in a short period of time?**

Spun pipe supply is dependent on the number of moulds available for each pipe size. VT pipes use one mould to achieve many castings per day. This gives Humes the ability to supply major contracts in a fraction of the time, adding a new dimension to project efficiency options.

**Will VT pipes be more expensive?**

VT pipes will have the same standard cost as spun equivalents.

**What sort of rubber ring jointing systems will be available?**

A stable rolling ring joint and a new sliding ring design either pre or field lubricated.

**Will rubber ring systems be designed to a specific standard?**

Yes to the European standard BSEN 1916:2002 and AS/NZS 4058:2007.

**Will the ring system provide adequate deflection capability?**

Yes, the joint draw is generally greater than the equivalent spun joint.

**If the pipe is thicker will it give me a longer design life?**

Theoretically VT pipe will provide a design life in excess of 100 years

**Will there be lined pipe options for sewer applications?**

Yes VT pipe manufacture will mean Humes can replicate most lined pipe offers.

**Will we be able to order all classes in VT pipe?**

No, initially we will cover Classes 2 to 4 inclusive.

**Will the range of pipe specials be available in VT?**

Yes, we can still make whatever is required.

**What is the long-term future for VT pipes?**

VT will be a sustainable and cost effective concrete pipe alternative into the foreseeable future.

**Is VT technology really more environmentally friendly than spun technology?**

VT is a safe and environmentally friendly manufacturing process, producing less waste and using 30% less energy to produce.

**Is VT pipe a credible replacement for spun pipe?**

The product has a long and successful history. VT pipe will be fully compliant with AS/NZS 4058:2009

**For more information on VT Pipe Technology email [vtpipes@humes.co.nz](mailto:vtpipes@humes.co.nz)**

## VT pipes won't cost any more

The VT pipe making process is more efficient than spun. The offset to this is the extra volume of concrete required to make each pipe. The immediate result of this is that VT pipes will be no more expensive than spun pipe. The real benefits of VT pipe for Humes are accrued through the reduction in waste and improved safety around the manufacturing process. For the customer, the VT process offers a more robust product with increased performance and a quicker supply of product.

## Why VT pipes weigh more?

There is one simple reason why VT pipes are thicker and weigh more. Spun pipes are cast horizontally and stay in their moulds for the first 24 hours for initial curing which includes steaming. Without the steaming process, the stripping time for spun pipes would be between 48 to 72 hours.

VT pipes are demoulded immediately following the compaction of the pipe and are stood vertically. The pipe simply needs more concrete volume to enable the product to be demoulded and stood up.

## Don't be concerned that the pipes look rough



As we mentioned the pipes do look different and the main point you will notice is the rougher interior and exterior texture. The initial view on this is that it will affect the performance of the pipe.

The first point to understand is why VT pipes are rougher. VT pipe is cast using an interior and exterior mould. The pipe is stripped out of the mould while the product is still "green". During this stripping process the air pressure released from the mould develops small blow holes and draw lines. The spun pipe has no inner core, the wet trowelling of the inner surface and the stripping of the mould after initial curing provides the characteristic smooth finish.

The second point to take into account in relation to this is that VT pipes meet all relevant AS/NZS and BS/EN standards. They are fully compliant to be sold and used in New Zealand and are used in most other countries around in the world.

Specifically AS/NZS 4058 covers defects permissible on the surface of pipe. VT pipes will comply with these requirements. The pipe is not porous and confirmation of this is demonstrated by the excellent absorption values and hydrostatic test performance of the pipes.

AS/NZS 4058 also covers blowhole defects permissible to the surface of the pipe. VT pipes comply with these requirements. The VT process requires greater nominal cover, 20 mm, hence 4 mm blow holes are relatively insignificant in terms of detrimental durability impacts and will not compromise the 100 year design life of a VT pipe.

In relation to crack width the AS/NZS 4058 does allow for increased crack width for some situations but Humes VT pipe will maintain crack widths applicable to the minimum 10 mm cover situation unless otherwise agreed with the engineer and/or asset owner. For normal environments this provides assurance of a design life well in excess of 100 years, realistically in the 200 plus year range.