

# Many years ago a man had a very strange idea

**His name was Charles Liernur and in the second half of the 19th century in Holland this Dutch engineer was looking at ways to reduce the amount of water in waste products in order to be able to utilise waste products for soil improvement.**

He came up with a really good idea. He decided that transporting waste in sewer pipes with large amounts of water was not only a waste of water but it also made a potential source of fertiliser not economically usable. Charles invented the world's first vacuum sewer but it was not until 1959 that the Swedish engineer, Joel Liljendahl, realised the huge potential of vacuum toilet systems and developed the concepts further. Eventually, Joel Liljendahl sold his concept to a company called Electrolux (for those of us who are old enough, this name should ring bells as being probably the first vacuum cleaner your mum owned).

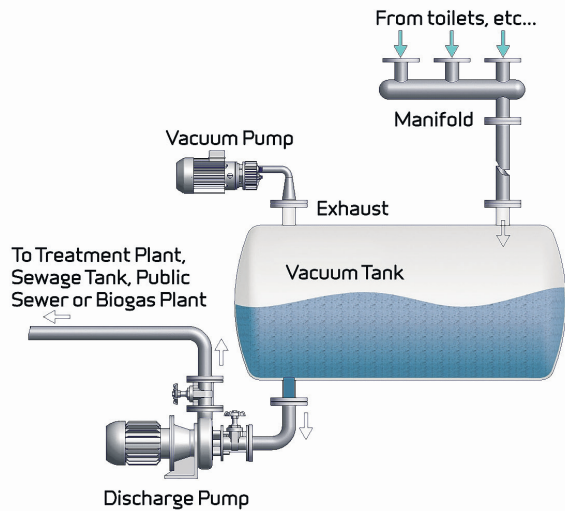
Electrolux developed the very first generation of commercial vacuum toilets and vacuum generating systems, below is what it looked like.

The vacuum tank system is a well-known principle and has for more than 100 years been used in a wide range of industrial applications. This solution was introduced for use in Vacuum sewage applications early in the 60's.

A tank is put under vacuum by use of an air pump that sucks air out of the tank. Effluents are collected in this tank, which is constantly kept under vacuum. The disadvantages of this system soon became evident, large tanks, multiple pumps, vents discharging methane gas and odours all led to its limited use today (it is used in some prisons and is the method used for septic tank recovery today). The expense and physical size of these systems made them uneconomical to purchase and operate in all but the smallest applications.

Engineers wanted more and the markets were demanding better, cheaper and more efficient solutions.

## Vacuum Tank

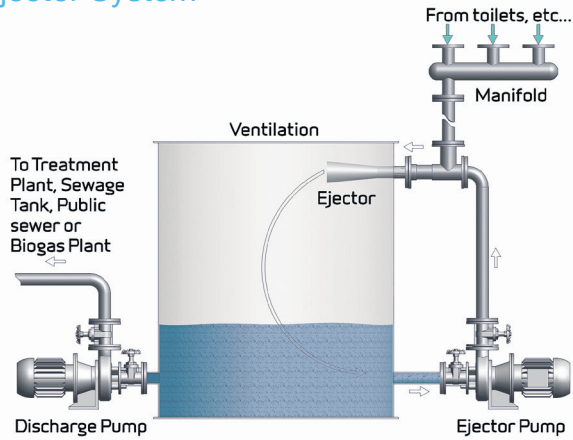


**First Generation Vacuum System**

In 1975 a Finnish company developed new technology for generating a vacuum. The new solution was to make use of an atmospheric collecting tank and to pump black water through an ejector to create vacuum. This system was simpler and more economical than the Electrolux vacuum tank/vacuum-pump/discharge pump system, below is what the Finnish company developed. In 1985 the company acquired the Electrolux vacuum toilet system and established a monopoly in the market. Use of an ejector to create vacuum is an old and well known principle. It was first discovered by another Dutchman, a physicist and mathematician, Daniel Bernoulli, born in 1700 and published in his book "Hydrodynamica in 1738. An ejector is a nozzle and vacuum is created by pumping liquid via this nozzle. The speed of the liquid creates a vacuum at right angles to the direction of flow (Daniel was a smart cookie to discover that). In order to operate the ejector, a centrifugal pump and a pipe between the pump and the ejector are needed. A considerable volume of liquid is at all times needed in the tank just in order to generate vacuum. Ejector systems have in general a low power to efficiency rate and they also have some other drawbacks; a large circulation of liquid, foaming (needing anti-foaming chemicals), collecting tank overheating due to high speed circulation and the ejectors can only handle very small amounts of grey water.

Once again Engineers and markets were demanding cheaper and more efficient vacuum systems, without foaming problems, complicated setup and large size.

## Ejector System

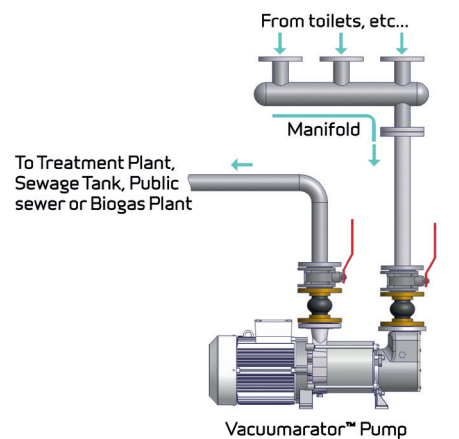


**Second Generation Vacuum System**

In the early 1980's a Norwegian Chief Engineer, Olav Hofseth, decided that it was time to end the monopoly held by the Finnish company utilising the old Electrolux vacuum generating method, and he had just the idea to do it. Olav was a trail blazer who lives in Hareid, a remote island community in the middle of the Norwegian peninsula. Olav did what all trailblazers do (and as Steve Job's did many years later), he hawked his idea around his local community and raised capital to start Jets Vacuum. Olaf's idea was simple, elegant and super efficient. He combined Helivac technology invented by the Danish engineer, Willy Johst, with a highly efficient macerator. These first vacuum generators from Jets brought down the monopoly and offered customers new and highly competitive vacuum solutions. Refinement of the technology introduced by Jets in 1987 gave the market a unique inline vacuum generator. The first the world had ever seen.

Since then Jets Vacuum has continuously developed the Vacuumator technology, with a second version being introduced in 1993, a third in 2000, and the latest and currently most efficient, introduced in 2006. Jets vacuum systems are the culmination of advances in vacuum technology since Charles Liernur first looked at the idea. Today Jets Vacuum systems are the number one system in use in the marine and land based applications worldwide.

## Jets Vacuumator pump



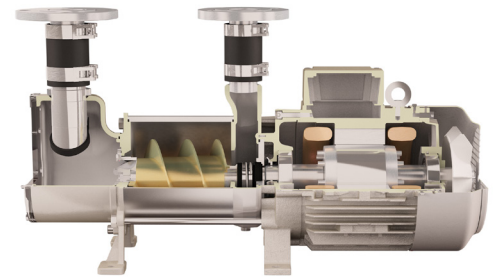
**Third Generation Vacuum System**

Jets Vacuum pump stations are the smallest and most efficient system available and, coupled with the company's full range of porcelain and stainless steel vacuum pans and urinals, they offer unprecedented scope from design, installation and operation. The truly inline vacuum pump creates vacuum, macerates and discharges the waste with no intermediate tanks or pumps required. The Jets Vacuumator has started a revolution in the industry. The Australian Distributor for the full range of Jets Vacuum pump stations and sanitary pans and urinals is Vacuum Toilets Australia based here in Perth, Western Australia. We can supply vacuum pump stations for one to one million people or more; in fact, the capacity of the Jets Vacuumator is unlimited. Very small footprints, simple uncomplicated design

and function, coupled with very small diameter piping, no gravity fall requirements, odour and humidity free toilet cubicles, and consuming a mere 0.8 litres of water/flush, make Jets vacuum systems the logical choice for any commercial application.

So, thanks to visionaries like Charles Liernur, Joel Liljendahl, Daniel Bernoulli, Willy Johst and Olav Hofseth, today we have a very elegant solution to the tragedy of flushing 90% of our fresh water down the toilet.

## Jets Third Generation Complete Vacuum pump



## Jets Vacuum wall and floor mounted pans and vacuum urinal using 0.8 litres/flush



The population of Perth is currently 2.4 million, by 2050 it is expected to be 4 million. If those extra people flush a 3.5 litre gravity toilet just once per day they will consume 5,600,000 litres of fresh water which equates to 112 average house swimming pools full. Now if those people were to use a vacuum toilet at 0.8 litres/flush, they would consume 1,280,000 litres of fresh water which is only 26 swimming pools full.

The heart of the Jets Vacuum Toilets system is the patented Vacuumator pump. This pump creates vacuum, draws waste from the pans, macerates it and discharges it all to a sewer or other facility. With the advances in technology, the Jets Vacuumator pump now accomplishes everything that the first and second generation vacuum pump systems were doing with several air pumps (needing discharge vents), as well as discharge pumps and macerators and large intermediate holding tanks. Jets accomplishes all these functions in one small pump that needs no intermediate holding tanks, transfer tanks, vents or air pumps.

Jets Vacuum Toilets technology has come a long way, the world is embracing this technology because it simply makes sense.

Melbourne Water installed a Jets Vacuum System in their new HQ three years ago and they are saving 9 million litres of water every year. We have been installing Jets Vacuum Systems to the Australian and NZ marine industry since 1994 with our sister company, Marine Plant Systems.

Vacuum Toilets Australia, we are a local Western Australian based company.



**VACUUM TOILETS AUSTRALIA**

[www.vacuumtoiletsaustralia.com.au](http://www.vacuumtoiletsaustralia.com.au)