



Hurricane 100mm Powered Rotary McVent

General Information Document.

History.

The original Hybrid toilet system was developed with an inline vent fan to create a negative pressure on the toilet pedestal. The negative pressure concept works well but the durability of the fans has proven to be a major issue. Over time we have changed fan types and changed suppliers from America to Germany in an attempt to improve the durability of the fans. The very nature of an inline fan places it in the air stream. This creates a maintenance step that requires the fan to be removed and cleaned on a regular basis and replaced when it fails. Fan life varies from system to system but is not at a level that we and our clients are happy with.

For a number of years now, we have been investigating alternatives to this inline fan. An inline fan inherently has the issue of being in the air stream thus creating a maintenance step to keep the fan clean and operational. This drove us to then look at creating an alternative air removal system external to the vent tube. The obvious choice so it seemed was to introduce a venturi system to the vent.

We asked James Cook University Mechanical Engineering department (one of our partners in the Hybrid) to study the potential use of a venturi system to vent the unit. It was very quickly determined that the power required to operate a venturi successfully was way above what we are able to realistically supply on what is normally a remote area installation. We do however use venturis in underground mines where mine air is in abundant supply.

The factory gives birth to an idea.

An idea was floated out of the factory by Ken McKenzie our factory Assembly Supervisor who is responsible for building all the Hybrid units. Kenny's idea was to put a motor in the lid of the normal rotary ventilator to drive the vent. Initially we were quite skeptical but Ken and Ian Gough pursued this idea and approached our ventilator supplier Edmonds. We received a visit from the General Manager of Edmonds to see if this was genuine enquiry as they had been thinking along a similar line and now the McVent has come into existence. This unit was quite some time in its development as it is very different to current Products and technologies. The prototype unit has been on test for around 9 months at our factory in Townsville on an operational Hybrid Toilet unit. The test prototype was sent back to the factory. It was run on the test rig to check performance and pulled down to check for corrosion. Only tiny amounts were found on a metal clip. All parts were reassessed and where required replaced with Plastic.

This has led to Edmonds the manufacturer offering a 2 year warranty on the unit.

Design requirements.

Some of the key drivers in the design of the unit were,

1. Durability. As long as possible service life.
2. Minimal maintenance. No such thing as none.
3. Remote to the air stream. Very high desirability.
4. Ease of installation.
5. Ability to be retrofitted to all existing units.
6. Low power requirement.
7. Replace two inline electric fans with one power driven unit.
8. Combine the fan and the rotary vent into one unit.
9. Reduce inventory and streamline the supply chain.
10. Buy Australian.



Results.

1. Durability has been addressed by ensuring all parts are corrosion protected or are nylon plastic. The motor is a brushless EC design ensuring maximum service life.
2. We anticipate the maintenance to be restricted to an annual cleaning of the ventilator with a brush.
3. The electric motor is mounted in the head of the ventilator behind a deflector plate. There are no fan blades in the air stream. The electronics are buried in a resin coating.
4. Installation of the unit is as per normal for mounting but requires wiring from the top of the vent to the power source.
5. It is possible to be fitted to the majority of installations. Assessment of power supply is required as to suitability.
6. The unit will run on voltages from 4.5. through to 12 volt. The ideal being 4.5 or 6 volt. See notes below.
7. The flow rate delivered by the unit is not quite double two standard fans but our test deems it adequate to replace the two current design electric fans.
8. This design delivers the combined exhaust and wind assisted rotary ventilator.
9. These items are now available in Australia reducing our lead times.
10. Not quite, but nearly all items are Australian made.

Power requirements.

All systems are different and the values shown below are factory tests and are for comparative information. In field results will vary from results shown.

PAPST Inline Fan.

The current 12 Volt fan will deliver approximately 54 m³/h at 12 volts drawing 1.25 watts @ 0.1amps.

The limitations of the current fan are,

1. It is an inline design and requires cleaning due to buildup of material on the blades. If not cleaned regularly buildup will cause the fan to stop turning increasing likely hood of electrical failure.
2. The working environment is high in humidity and is corrosive to some degree which eventually leads to fan failure.
3. The fan life is not at a level that is desirable in the long term.
4. Being inline, it requires manual removal and cleaning which requires valuable staff time.

McVent Unit.

This powered unit will deliver approximately;

1. 90 m³/h, drawing 2.52 watts @ 0.21amps from a 12 volt power supply reduced through a switch mode controller to 4.5volts.
2. 106 m³/h drawing 4.56watts @ 0.38 amps from a 12 volt power supply reduced through a switch mode controller to 6 Volts.

It is very important that power supplies are designed around the losses that may be incurred. Testing has determined that the switch mode design is very efficient at stepping down from 12volt to the lower voltages as described.

There are many advantages to the McVent unit and we believe that the combination of consultation with our clients over many years now and the efforts of the Research and Development Team of both Gough Plastics and Edmonds have delivered an innovation that will greatly improve the functioning and operation of the Hybrid Toilet System.