

## Clever 'blower-vac' engineered by e3k



*Pelican fills a vacuum for venues.*

Design a product that really sucks – that was the unusual brief presented to e3k, the Brisbane-based engineering product design and development consultancy.

The result is the trademarked Pelican Vac device that safely 'sucks up' bottles and cans – and it's attracting a lot of attention from stadium and venue operators and cleaning companies worldwide.

In the case of 'blower-vac' machines, the more it sucks, the better. For outdoor power equipment specialists Roy Gripske and Sons (RGS), of Narangba, Queensland, being able to safely pick up and collect partly full drink cans and glass stubbie bottles with a handheld blower-vac was a dream worth pursuing, given the potential demand from contract cleaners of stadiums and other large event venues.

In vacuum mode, all of the waste sucked into a conventional blower-vac machine must pass directly through the high-speed rotating impeller before being thrown into the collection bag. Some machines are even equipped with 'shredder' or 'mulcher' blades, designed to chop up waste as it passes through the impeller.

While the shredding option works well for lightweight waste such as leaves

and chocolate wrappers, heavy robust waste items such as cans and glass bottles tend to severely damage the machine and produce hazardous projectiles.

Paul Gripske, of RGS, said the company approached e3k with a preliminary working prototype machine and a challenge. The machine was an off-the-shelf blower-vac that had been custom-adapted to allow debris to bypass the impeller entirely, continuing directly into the waste collection bag.

The challenge presented to e3k was to overcome the loss of suction resulting from this modification. The prototype was intended to pick up heavy cans and glass bottles, so maximising the suction was of paramount importance to product success.

### DESIGN PRESSURE

Engineers at e3k initially qualitatively examined airflow patterns before taking detailed quantitative experimental measurements of air velocity and suction pressure in both the prototype and in a conventional blower-vac of equal power.

Based on these measurements and on engineering principles, e3k made design recommendations to achieve maximum suction, and a further prototype was engineered, leading to testing of a modified bypass concept.

Within this iterative testing and refinement process, an alternative layout concept was identified, different from that initially proposed by RGS but most likely to achieve their 'glass bottle lift' target.

The final design, known as the Pelican Vac and now being commercialised, safely lifts and collects cans and glass bottles into a removable heavy-duty container, while collecting lighter waste such as leaves and wrappers into a separate fabric bag. The 'glass bottle lift' target has been achieved safely, without increasing the power demand and with the added advantage of separating the recyclable high density waste from the non-recyclables.

Pelican Vac project leader, Colin Kent of RGS, said the product is already attracting worldwide interest from manufacturers of blower-vacs used by commercial contractors for maintaining stadiums, parks, festival sites, and other venues where consumer refuse is generated.

The Pelican Vac was demonstrated to the world at the Green Industry Equipment Expo (GIEE) at Louisville, Kentucky, USA, in October last year.

Ben McGarry of e3k said the research, development and testing of multiple prototypes built a deeper understanding of the problem and helped to catalyse the ultimately successful solution. Dr McGarry said this highlighted the important role that the iterative prototyping process plays in developing new products.

"Prototyping is not simply a tick box to 'check that it works' – prototyping 'buys information' about the design, spurring the improvements and innovations that turn a good idea into a great product," he said.

By taking an engineering and scientific approach to product development, Gilmore Engineers-e3k president Duncan Gilmore said e3k was able to assist RGS to create a "glass and heavy can-capable handheld blower-vac that really sucks".

[www.pelicanvac.com](http://www.pelicanvac.com)

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