

on

Dyson news  
2007, Issue 6

**Dyson Malaysia**  
The meaning of manufacture

It's easy to think that work ends in Malmesbury and is then taken-up in Malaysia. **In reality**, teams from both countries working together to turn Dyson prototypes into the machines you buy in the shops.

This issue Dyson news removes the mystery from Malaysia to explain how manufacturing works.



**I started out making aeroplanes.** Not Airfix kits but commercial and military jets at British Aerospace. When you're building something as complex as an aeroplane, you break it down and use different manufacturing systems at different stages. So, millions of rivets and bolts are mass-produced by a broad supply base, hundreds of sub-assemblies are put together in small manufacturing teams and one 'final' aeroplane is finished in a unique finishing environment.

**Same goes for Dyson vacuum cleaners.** We use different manufacturing systems appropriate to different stages – injection moulding, flow lines, cells and finishing. This allows us to be fast and flexible so that we can make blue machines in the morning or pink ones an hour later. We now produce one vacuum every 20 seconds with component parts

synchronised to arrive never too late and importantly never too soon!

**Johor Bahru is an excellent location for manufacturing our vacuums.** It's located close to the ports of Singapore from where we ship our machines all around the world. There's a good local supply base (for the 20 million different parts we need per week). The Malaysians are also known for their expertise in injection moulding – the technique which allows us to mass-produce plastic parts. We now manufacture in China too, using Nanjing's expertise in die-casting to manufacture Airblade™.

**Manufacturing is not an add-on to the design process.** Engineers are constantly thinking how their components will be manufactured. Keith Curtis coaches the graduates in the art of tooling and daily

conversations between Malmesbury and Malaysia mean a smooth transition from prototypes to test to production.

**Our challenge is to balance our priorities of quality, flexibility and cost.** Quality is a must; flexibility is really important as sales forecasts can fluctuate quite significantly each week and cost is a constant task like the myth of Sisyphus! We're lucky though: there's a great team of people here and in our factories who work like Trojans to get the best possible machines rolling off the production line. This year we will make almost five million machines and Ross, Gordon, Suzuki-san and the team in Europe will sell almost all of them.



## Dyson tooling Subheading here

If you were to methodically pull a Dyson vacuum cleaner apart, piece by piece, you'd end with about 150 or so parts and a cluttered floor. Each of these parts is a unique design which needs its own piece of equipment to make – a tool.

Tools are pieces of steel cut and fitted together to make a mould for each part. Molten raw material goes in, cooled until it solidifies, then taken out.

Tooling is carried out by Dyson teams in the UK, Malaysia and China. Keith Curtis oversees tooling globally.

“There’s a misconception that tools means hammers and spanners; this not tooling in the Dyson sense. It’s a way for us to mass produce components consistently and quickly.”

Malaysian tooling manager Lea Yuen Pok has been with Dyson for seven years and leads a team of six tooling engineers. “The most enjoyable part of the job is that every project is a new design – which keeps us thinking,” he says. “The day-to-day challenge is to respond to requests from engineers and make changes so production isn’t delayed.”

On average, a new Dyson has 140 plastic injected tools, 20 rubber tools and five press tools. A set of tools able to make 6,000 Dyson vacuum cleaners per week costs around £3,000,000.

The most expensive tool was the Tub Rear for CRO1 which cost £216,000, weighed 15 tonnes and was the size if a Mini.

ASSEMBLY

EACH WORKER HAS 30 SECONDS TO ASSEMBLE THEIR COMPONENT. THE ATMOSPHERE IS CALM.

THIS IS THE MEIBAN ASSEMBLY LINE. MEIBAN ARE ONE OF DYSON'S PRODUCTION PARTNERS.

TOOLING

THIS IS THE VSI INJECTION MOLDING FACILITY. THEY HAVE MORE THAN 1000 DIFFERENT TOOLS FOR DYSON COMPONENTS.

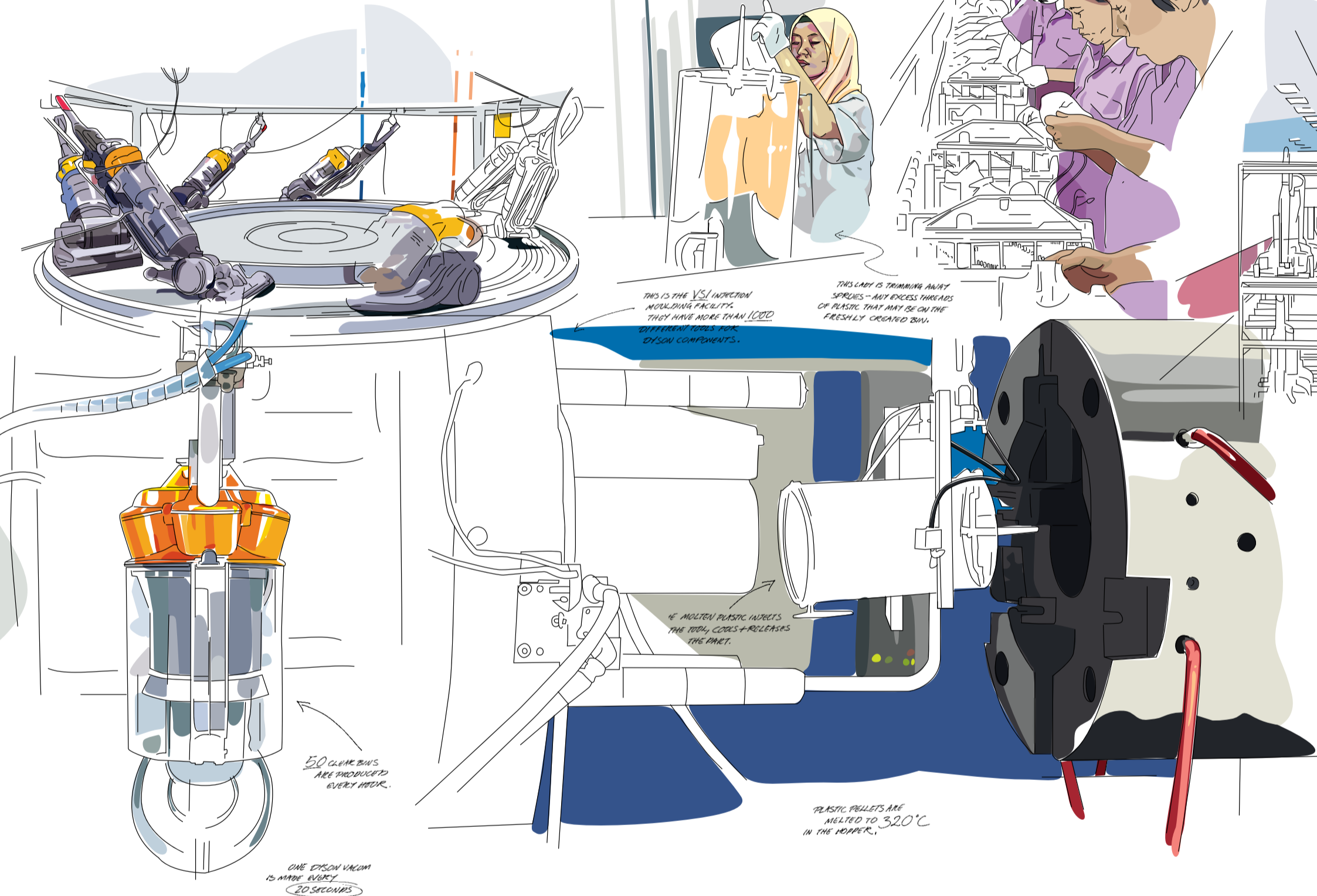
THIS LADY IS TRIMMING AWAY SPRUES - ANY EXCESS THREADS OF PLASTIC THAT MAY BE ON THE FRESHLY CREATED BIN.

THE MOLTEN PLASTIC INJECTS THE TOOL, COOLS + RELEASES THE PART.

PLASTIC PELLETS ARE MELTED TO 320°C IN THE HOPPER.

50 CLEAN BINS ARE PRODUCED EVERY HOUR.

ONE DYSON VACUUM IS MADE EVERY 20 SECONDS



## Dyson people Siti Hawa Musa, HR advisor

“My role is to look after Dyson people in Malaysia. This includes recruitment, training and looking after people who’ve come over from the UK.

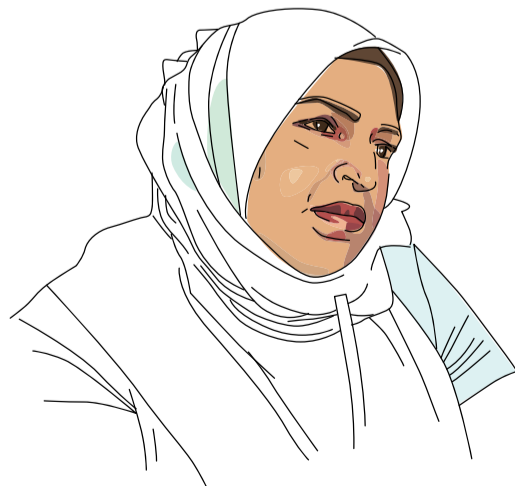
When I started two years ago there were about 100 people at Dyson Malaysia. Now it’s more like 300. This year alone, 130 people have joined. And that number is only going to get bigger.

In addition, we have about 20 Dyson people from the UK working in Johor Bohor. They help oversee the completion of the designs that they helped conceive.

This year was a busy one. We had projects transferred over from the UK, including DC22. Because we’re so busy, the engineers have to be multi-skilled, independent and, most of all, passionate about what they do. Everyone has worked very hard to achieve what we have.

But it’s not all work. The engineers are big fans of indoor football. There are various internal teams that play friendly matches against each other. Needless to say, these can be quite competitive.

As for me, I prefer a quieter life. I like cooking and watching movies at home. Looking after so many people is hard work enough!”





THE ASSEMBLY LINES ARE FLEXIBLE. THE FACTORY CAN SWITCH TO MAKING A DIFFERENT MACHINE IN JUST 15 MINUTES

STAR! THIS SIGN HIGHLIGHTS A COMPLICATED ASSEMBLY PROCESS SO THAT THE WORKER TAKES EXTRA CARE.

5 MILLION!  
THE NUMBER OF DYSON VACUUMS MANUFACTURED IN MALAYSIA IN 2007.

DYSON MACHINES ARE SHIPPED ALL OVER THE GLOBE BY MASSIVE MAERSK SHIPS.



PACKING

DYSON LOGISTICS HAS INTRODUCED A NEW SYSTEM TO INCREASE THE NUMBER OF VACUUM CLEANERS IN EACH CONTAINER. 804 CYLINDERS OR 750 UPRIGHTS FIT IN A 40FT HIGH CUBE CONTAINER.

THE COLOUR MASTER:  
THIS LADY IS CHECKING THAT EACH BATCH OF FRESH PLASTIC MATCHES THE DYSON HUES.

QUALITY CONTROL

QUALITY IS A PRIORITY FOR THE FACTORIES. LOTS OF CONTROLS ARE PUT IN PLACE TO MAKE SURE EACH DYSON IS PERFECT.

DYSON MALAYSIA PRODUCES 91,980 UNITS A WEEK ON AVERAGE. THAT'S 14,151 A DAY

Dr. Chong, mechanical team leader

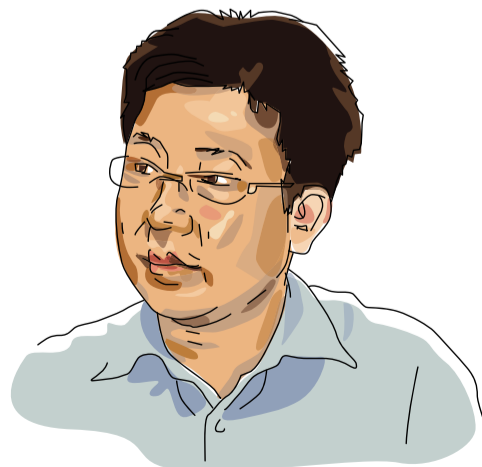
"I lead a team of 30 engineers and scientists, looking after five areas: pick-up, fluid dynamics, finite element analysis, materials and mechanics. The team supports projects that transfer over from Malmesbury. I have been here for five and a half years and have been involved in many great projects – the Mini Turbine head, DC16 and other things I can't tell you about. I enjoy working with talented people and the challenge of pushing technology to the limit.

Before I came to Dyson, I studied at UTM – the University of Technology, Malaysia – just along the road from Dyson. This year the James Dyson Foundation ran student engineering workshops there.

My PhD project was in aerodynamics and I was inspired by the offshore wind turbines in Denmark.

Our wind conditions in Malaysia are quite low, but we do have hills – the Malaysian highlands and Mt. Kinabalu on the island of Borneo.

My prototype, constructed from aluminium plate for less than £1,000, took six months to design and six months to build on a site at the University, just 15 metres above sea level. It produces enough electricity to light a house and is still there today."





"We're in good shape. We've shown people what we've known all along – people want things that work better. And we make the best."

I've been at Dyson for a while now, nine years in fact. There've been many changes and challenges, but every year, we improve. 2007 has been one of our biggest yet.

It's been a year of growth.

Growth in investment: we've increased our investment in research and development – new floorcare technology, Airblade and... others.

Growth in people: 742 new faces across the world. We've knocked down walls, moved upstairs and across town to accommodate growing teams – Chicago, Tokyo and shortly Beijing. Meanwhile our manufacturing base in Malaysia is expanding faster than ever to cope with demand.

Growth in profit: We've increased our profit from last year while spending more on new ideas. We're in good shape.

We've shown people what we've known all along – people want things that work better. And we make the best.

Teams across the world have performed superbly. As a group we've grown by an incredible 28%.

If I had to highlight a single country it would have to be Canada. In its full first year the Canadian crew exceeded its targets – massively. **WHAT?** An amazing achievement.

Emerging countries are performing excellently as well. Like Russia: we've been there a number of years – but we're making progress now. In November James was there to launch DC19 and DC20, which we hope will kick start even more success for Constantine and his team in 2008.

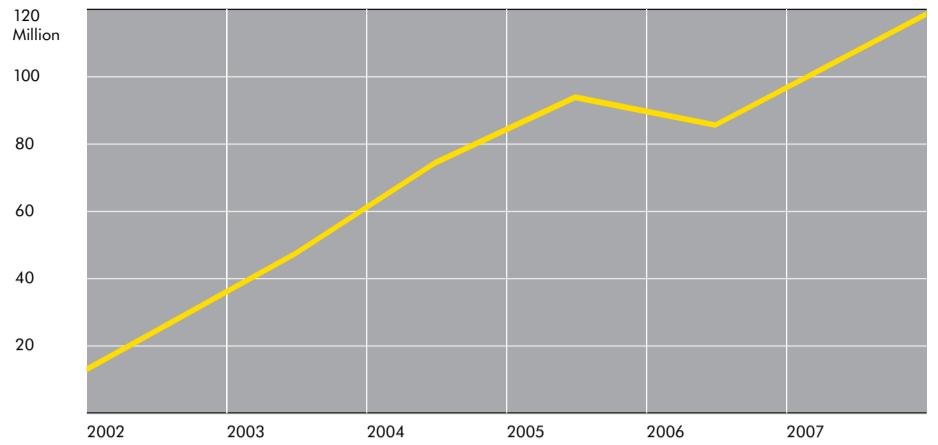
Again America has been a cornerstone. It makes such a substantial difference to Dyson. And one machine sold through Target raised \$1.2 million for Breast Cancer Research Foundation.

Then there's Dyson Airblade™: it's been immensely exciting. We've taken on an enormous challenge; we've done other appliances but with Airblade™ we've taken the business outside the home. I'm amazed with how quickly the public have cottoned on to it. People's reaction to the 'Airblade™ Experience' – whether it's online or in person – never ceases to amaze me.

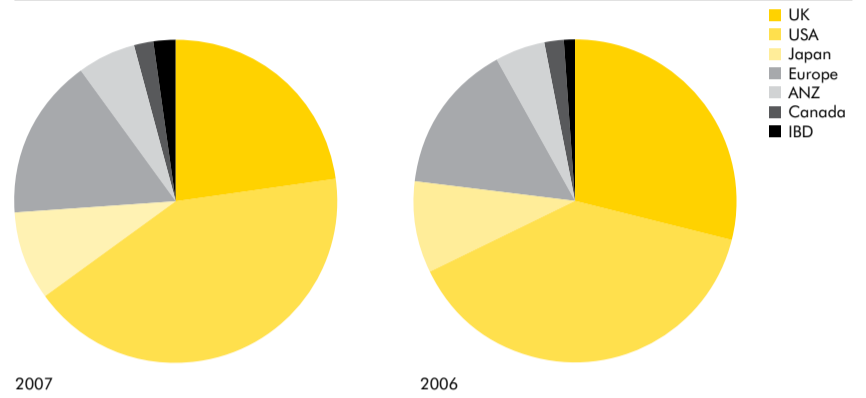
The fact that we've done so well is no accident. A result like this doesn't fall out of the sky: everyone at Dyson has really worked their socks off.

I honestly believe the reason for this is that people love working here. There's a simple measure for this: you either whistle on your way into work or whistle on the way back. Dyson people fall into the former.

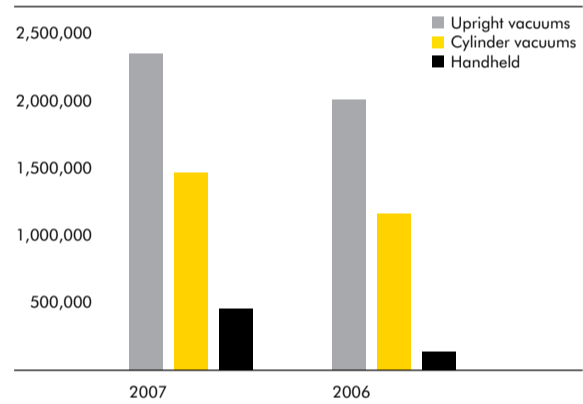
Dyson Group Profits



Dyson Group Floorcare Volumes



Dyson Group Floorcare Volumes



Dyson Group Profit 2007

£110<sub>m</sub>

Worldwide Growth

28%

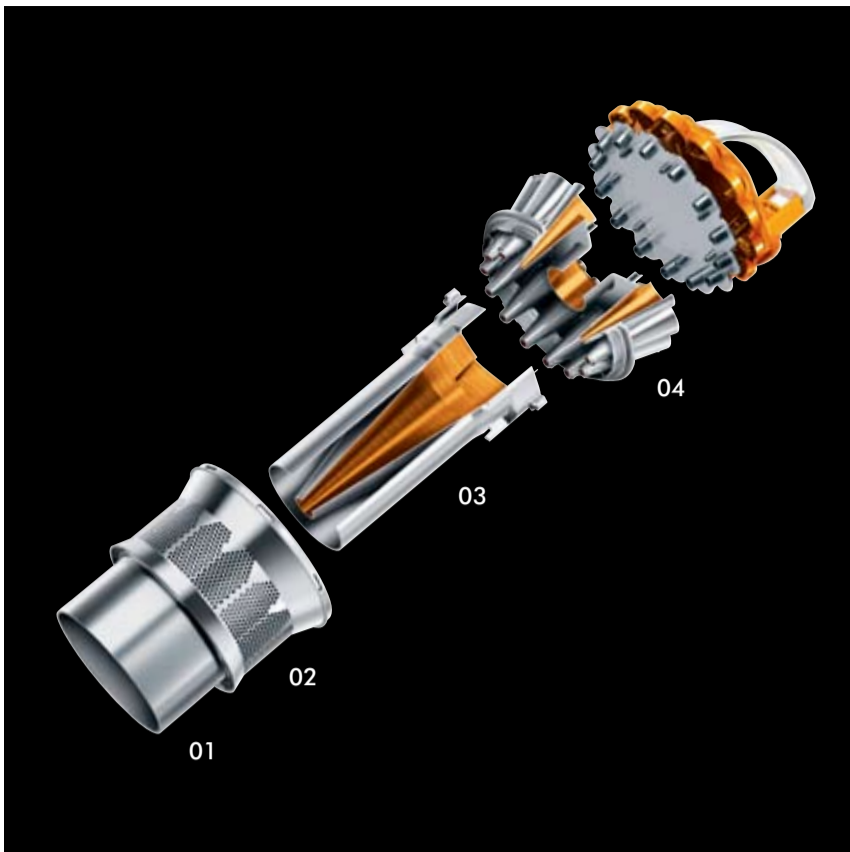
Dyson Vacuums sold

4.28<sub>m</sub>

New faces at Dyson

742

## DC22 Attack of the cyclones



The DC22 has an extra level of filtration – the Core Separator – which removes 50% more dust than before – down to 0.7 microns (1/1000 a pin head).

Many of us never see a Dyson design until it emerges fully formed from Malaysia. It's a process that's never [straight forward](#).

Take DC22. The challenge was to make a small cylinder machine with all the latest Dyson technology. But this brief belies all the different details (and difficulties) that go into making [the machine work well](#).

Arguably the most important facet of the machine is the new cyclone technology. DC22 has an extra level of filtration – the Core Separator – which removes 50% more dust than before – down to 0.7 microns (1/1000 a pin head). This means in Japan, where it was launched last month, the machine requires no maintenance.

But adding this third level of filtration made the body bigger – so the engineers needed to condense the machine while incorporating the new technology.

It's an impressive achievement. But the team wasn't content with that. They had to get the finer details right as well. For example, the release catch that holds the bin in place had to self-tighten so the machine doesn't fall off when picked up. Like many other aspects of the design it was tested on a two-and-a-half-D rig (imagine a Dyson pop-up book) until it was right.

Then there's reliability. "Before a prototype is even built we use finite element analysis to see where the machine is going to be stressed and strained. We then test those stress and strain points make sure it stands up to punishment," said Adam Bates, engineer. So the machine's wand, for example, didn't make the grade until it could survive a continuous bout of fall and rest tests.

Even sound has to be considered. There are different noise standards in different countries. In order to comply with Japanese standards the team moved the exhaust down on the left of the machine to make it quieter.

Finally, the design had to be airtight. Literally. All of the components had to marry up exactly so no air could escape.

This attention to detail takes time. But it produces better vacuum cleaners.

### DC22 diagram key

#### Outer cyclone (01)

First, dirt is drawn into a powerful cyclone. Centrifugal forces of 500G fling pet hair and fibres into a clear bin.

#### Shroud (02)

The air passes through here, while larger dirt that has escaped the outer cyclone is sieved out.

#### Core Separator (03)

A second, more powerful, cyclone removes 50% of dust down to 0.7 microns in size (that's 1/1000 of a pin head). The result is a boost in cyclone efficiency.

#### Inner cyclones (04)

Finally, a cluster of smaller, faster cyclones generate centrifugal forces of 150,000G – extracting particles as small as mould and bacteria.

## Dyson Airblade™ One year on



Dyson Airblade™ is also an international award winner. Accolades include the Janus de l'Industrie Award in France from the French Institute of Design.

So Dyson Airblade™ is one. And what better way to celebrate a birthday than a get-together. Or rather 12 of them. Over the last two months, Dyson Airblade™ has launched in 11 European countries and Australia.

Glenn Andrew, global managing director for Airblade™ said: "It was quite a challenge – we've never launched a design in so many places in such a short period of time."

Even the more sceptical journalists were converted. Eric Philippe of France Bleu Radio confessed: "I was quite frankly not convinced that I could talk about hand dryers to my listeners. And now that I have tried it, I can't wait to spread the word. It is really a revolution in everyday life."

The Airblade™ team is already out on the road. "We're demonstrating the machine in trade shows in every country," says Nicola Ashley, who is responsible for Airblade™ marketing in Europe. "There's a lot excitement from people who've heard about it and are keen to try it out."

The team is growing in Europe with more people being recruited to help with sales, after sales, installations and customer care.

Over in the UK, Dyson Airblade™ is starting to appear in a number of stores, restaurants and service stations.

It's also going into some of London's biggest and busiest train stations – Victoria, Waterloo and Liverpool Street – where it will be used by millions of visitors a year, as well as hospitals and football grounds.

Dyson Airblade™ is also an international award winner. Accolades include the Janus de l'Industrie Award in France from the French Institute of Design, a National Energy Efficiency Award and Society of Food Hygiene & Technology Award for Best New Product in the UK.

It's becoming recognised as quickest and the most hygienic way of drying hands.

Canada, China and Japan are up next.

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