Borne out of the ashes of a marketplace failure, Dustbuster created a new mass-market category as it took the Black & Decker brand from the workshop into the home. Dustbuster has continued to lead the category for thirty years.
In 1972, Black & Decker was getting worried. They had every reason to be. Their core power tool business had been under assault from foreign competition since the 1960s. While their low-cost consumer power tools had been successful since post WW2, that very success had eroded their reputation in the more profitable professional power tool category. After decades of growth and success, people were beginning to think of Black & Decker as the low-end manufacturer. This did not sit well with the Maryland-based company. Their foundation had been built on innovation and quality… quality that had been recognized in 1943 with the prestigious Army-Navy E Award. Only five percent of the thousands of manufacturers eligible were awarded this merit for outstanding production in support of the War and Navy departments. It was only natural for Black & Decker to draw upon their history of creating breakthrough innovations to propel their business through trying times.

An Historic Heritage - To the Moon and Back

In 1960, the space race was well underway. NASA was very interested in battery-based, “no-torque” power tools. Cords were problematic both because they were easy to get tangled in and because the nearest electrical outlet might well be nearly 250,000 miles away. Torque, on the other hand, was a big problem in zero and low gravity. Thanks to Newton’s Third Law, an astronaut using a high-torque drill in space would be launched into orbit… around the drill bit. Since whirling dervish astronauts weren’t the goal, NASA awarded Black & Decker a choice contract. The challenge was to develop cordless, rechargeable, “no-torque” electric wrenches for use in space, and drills for extracting core samples on the surface of the moon.

Battery-operated products using dry-cell zinc batteries had been around for decades. But their use was primarily in toys or other small products that required very little power. Since zinc batteries had limited capacities, the batteries would need frequent replacement in situations with higher power requirements. In the 1960s, General Electric (GE) developed new rechargeable nickel cadmium (NiCad) batteries with considerably more power and life. Using these new batteries, Black & Decker introduced the world’s first cordless rechargeable drill in 1961. A year later, they used the same technology in a shrub trimmer. Despite these advances, the new technology remained costly and inefficient.

Funding from the space program fueled the breakthroughs required to deliver the cordless Minimum Torque Reaction Space Tool, which was used in 1964 by Project Gemini astronauts working in weightless conditions. Later, in 1971, the Black & Decker Moon Drill was used on the Apollo 15 mission to the lunar surface.

Cordless Goes Modular

The research undertaken by GE and Black & Decker for the NASA projects greatly increased the quality and reduced the cost of rechargeable batteries. This opened up new opportunities for battery powered consumer products. In
1969, a cordless reel lawn mower was introduced. It used much larger rechargeable batteries than the small NiCad batteries used in hand tools.

So, when they found themselves under attack by low-cost foreign competitors, Black & Decker knew better than to simply square off against the competition in a price war. Remembering the entrepreneurial spirit of founders S. Duncan Black and Alonzo G. Decker, they sought instead to regain their competitive edge by developing high-end innovations. They began by engaging in an extraordinary internal effort focused on new product research and development. The overarching strategy was to increase sales growth by expanding beyond their strong, power-tool base and into labor-saving devices in general. Where others might have focused on cost-cutting, Black & Decker execs focused on creating new products that would expand their business into new markets.

One of the most interesting such projects was the development of the Mod 4 Power Handle Cordless System guided by senior industrial designer Rod Bunyea. The name was derived from the four NiCad power cells in the handle. The concept began as an attempt to develop a new handheld, cordless grass shear that could, with the addition of a wheeled extension handle, also be used in a standing position. The grass shear design was configured in two parts – the business end with the clippers, and the power end that included the batteries in a handle housing. The extension tube for stand-up use fit between the two parts. This design inspired an entirely new concept for modular products. With a separate power handle, additional functional assemblies beyond the grass shear head could be attached. For example, a ¼” drill head, a shrub trimmer, a sealed-beam lantern, and a small vacuum cleaner called the Spot-vac. All would be compact, cordless, and hand-held, and all would be interchangeable with a single, rechargeable power source. Most importantly, the retail price of such a modular system of products would be considerably less than the cost of five individual products. Amidst high expectations, the Mod 4 system was introduced in 1974 and immediately hailed as an innovative new product. In May 1977, it was featured in Fortune Magazine as one of the 25 best designed products available in the US.

**A Hard-Learned Reality Check**

Despite all the acclaim, the Mod 4 system was a failure in the marketplace. Sales were far less than anticipated. Post-mortem market research revealed the reasons. First and foremost, buyers did not like to buy multi-purpose products. The Mod 4 was deliberately sold as a set of five, simply to make the price of each seem more reasonable. If sold individually, the cost of the batteries inside each separate unit would make the price too high. But even though the price of the entire system of five products was about the same as the price for two, buyers simply preferred to buy one product at a time.

Rechargeable batteries were confounding to new users. Most people were more familiar with existing battery-operated products, like toys, which used disposable batteries. They simply didn’t understand that the new batteries in the Mod 4 were actually rechargeable. These people regarded any battery-operated product as unreliable and requiring frequent, costly battery replacement. And those who understood the idea of recharging were tripped up by the lack of a “ritual of recharging.” They’d forget to put the power handle in the charger after finishing a task. This meant that, when they wanted to use it again, the whole system was dead. On top of all this, due to a business recession, Black & Decker was unable to spend enough to promote the Mod 4 system and properly explain the concept to the general public. Black & Decker learned some important lessons from this
experience—market research should be done before investing in a new product. And when you create an innovation that completely changes the existing user experience, consumers will need to be educated about the use of these new technologies. At the time, it would have been difficult to imagine that the smoldering ashes of the Mod 4’s failure would give rise to Black & Decker’s most successful new product in history.

Out of the Basement and into the Kitchen

In early 1977, a positive nugget was unearthed. It turned out that 92% of women users surveyed in the Mod 4 aftermath were highly satisfied with the Spot-vac. Many were wives of men who had purchased the Mod 4 system for their basement workshops. When hubby was out, the wives snuck down to the basement to get the Spot-vac to use upstairs. The women reported that they found themselves frequently using it to pick up minor spills of cereal or debris from the kitchen floor. This was much easier than going to the hall closet for their canister vac, lugging it to the kitchen, unwinding and plugging in the cord, and then, after a two-second pick-up, unplugging the cord, rewinding it, and lugging the canister back to its storage place in the closet.

Based on this preliminary research, Marketing suggested that as many as 50,000 units of a Spot-vac type product could be sold annually. This represented about 20% of the current hand-held vac market. Jim Martz, Black & Decker’s new product marketing manager met with Marty Schrock from Engineering and the new design chief, Carroll Gantz. Gantz had joined Black & Decker in 1972 as the manager of industrial design for the US Consumer Power Tool Division. Prior to that, he’d spent 17 years at Hoover. When Gantz joined Black & Decker, he happily thought that he’d never have to design another vacuum. But when Black & Decker decided to explore design concepts for a kitchen vac, Gantz’s years of experience would prove invaluable.

The Mod 4 research identified a number of specific complaints and problems that needed to be addressed. Low power was the main issue. Some thought recharging time was too long. Some didn’t like the messy paper filter bag, and some didn’t like the nozzle. Some didn’t know where to store it, or how to recharge it. Some thought it didn’t look like a woman’s product. But, in spite of all these complaints, 92% of the women surveyed were quite satisfied!

Within a few days, a preliminary model was ready, cobbled together with modified Spot-vac components and a wall-mounted charger base. The development team agreed that the proof-of-concept model was too reminiscent of the Spot-vac and still looked too much like a power tool. It needed additional conceptual study to make it more compatible with the upstairs of a home or the kitchen environment. Design chief Gantz wanted to get as many ideas as possible before meeting with the New Products Committee. He assigned designers Rod Bunyea, Bob Somers, and Larry House to take a day and develop concepts independently.

When the team reconvened to discuss their design concepts, a number of key elements were identified. First, since the vac had to be constantly recharged when not in use, and since there are no electrical outlets in storage closets, the charger base would have to be kept in plain sight at or near a standard upstairs outlet. This meant that the base should visually suggest a home to which the vac was easily returned after use, without the necessity to plug it in. For inspiration, the Trimline phone was studied. Designed by Henry Dreyfuss Associates in 1965, the Trimline’s form-fitting nest for the receiver included the disconnect switch—the user needed only to hang up the phone when finished.
Secondly, since the vac and its charger had to be stored in plain sight, it needed to be as flat and compact against the wall as possible, so as not to be knocked off by passers-by. The answer seemed to be a flat rectangular cross-section, rather than the decades-enduring cylindrical shape of traditional hand vacs. This would also eliminate the problem of visual similarity to the current Mod 4 Spot-vac, and avoid the inappropriate “power tool” look.

Thirdly, with the vac stored in plain sight, no one wanted to see a dirty nozzle. It was suggested that the exposed nozzle and the business end of the vac could be tapered into a narrow opening similar to a crevice tool. This nozzle tip could then be hidden by the nest when stored. Finally, to visually convey the idea of a quick-and-easy solution to small spills, it was thought that the form of the vac could suggest the familiar flat wedge shape of the side view of a standard dustpan.

Gantz combined all of these concepts in a formal color concept sketch. In March of 1977, it was reviewed by the New Products Committee. The concept was very well received, and the team was authorized to proceed with refining it into a realistic appearance model. Gantz worked with the engineers to determine all the physical size requirements for batteries, charger, dirt cup, and motor. By September, they had produced a refined appearance model. The model was executed in colors designed to appeal to the current household market, and to avoid the then standard Black & Decker power tool colors of orange and white.

The Dustbuster is Born

The appearance model was used in market research to better determine consumer interest in the product. Research participants were shown how the new cordless vac might be used in the kitchen to pick up dry spills and other quick-cleanup tasks. People loved it! Marketing doubled their original first-year sales projections to 100,000 units, and on January 12, 1978, the design team got the final go-ahead for full development. A multidisciplinary development team was assembled, including key representatives from engineering, industrial design, marketing, and manufacturing. The headlong race to market was on.

Engineering’s challenge was to improve battery performance to optimize power and run time. Three NiCad batteries produced 150 hours, or five years worth of 15-to-20-second bursts.

A major decision was to eliminate the throw-away dirt filter bag, and use a washable, re-usable filter bag instead. This innovation was a very popular with housewives, who dreaded handling those dirty bags and constantly having to buy replacements at high cost. To empty the vac, one just snapped off the dirt cup and emptied the dirt directly into the trash. At this point, Marketing had a much larger challenge. Black & Decker had to somehow grow their brand image from the basement to the kitchen and from male buyers to female buyers. Also, Black & Decker’s usual hardware store distribution system was not going to cut it. Success in this new category would require massive
promotion within the trade and with consumers. It would also require a completely new distribution system to reach department and discount stores. This new product introduction would entail a huge capital investment with high risk. But Black & Decker had faith in the concept and their team.

One of the key strategic decisions made was to downplay the Black & Decker brand name on the product to almost invisibility, and to color the product in the currently popular household color of medium beige. The designers prepared an appearance model in the new colors, modified the charger shape to provide a more complete visual nest for the unit, and added the “Duster” name to demonstrate graphic possibilities. The name “Dustbuster” soon emerged from a company-wide contest. Subsequent public testing insured that the name communicated the aggressive power desired from such a product. The perception of “power” was so essential that the engineers deliberately modified the fan system to be noisier than it had to be, in order to convey an audible sense of power. A new Dustbuster logotype was developed and incorporated into the product. The Black & Decker logo was reduced to minimum visibility in order to avoid the perception that this was a power tool. By July 1978, a run of prototype models had been produced for both mechanical and focus group testing. The prototypes were 14 1/2 inches long and weighed 1.4 pounds.

**Great Expectations**

In early August, focus groups were conducted. Sixty percent of consumers interviewed said they would “definitely” or “probably” buy such a product. Based on this, Marketing raised first-year sales estimates to 250,000. This was equal to the entire current market for hand-held vacs. Marketing feverishly produced trade literature, packaging, and displays in preparation for the August 1978 Hardware Show in Chicago. The unveiling of the Dustbuster was an undeniable hit as it was declared “Best New Product in Show” by trade publications. When tested by consumer focus groups against three of the current top-selling appliances at the Show, the Dustbuster was preferred by 35%, compared with the GE Toaster Oven (42%), Mr. Coffee coffeemaker (17%) and a corn popper (5%). This amazing response caused Marketing to once again double their first-year sales estimates to 500,000 units.

All this was good news for Marketing, but a nightmare for Manufacturing. A year ago, they had begun planning for annual production of 100,000 units. Last month they had to more than double tooling and production plans to 250,000. And now they were being asked to double it again to 500,000! At the urging of Carroll Gantz, Black & Decker attorneys filed for a design patent—something they had never done before. Gantz knew that that the Dustbuster design would be copied very quickly. On December 7, 1978, a patent was filed to protect the Dustbuster’s unique form.

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**First Year Sales Projections (in units)**

Sales projections skyrocketed, as the design was validated at every step of development. First year sales of one million units still beat all expectations making the Dustbuster Black & Decker’s most successful new product launch to date.
A final pre-Christmas sales test of 6,400 pre-production units was conducted in December, 1978 in Kansas City, MO. It was a total sellout, and an additional 4000 orders were placed, for a total of 10,400 units. First year sales projections were raised again... this time to 750,000. Sales of the Dustbuster production units formally began in January, 1979. When all major account orders were tallied up in February, it was clear that over a million units would be sold the first year—the highest first-year sales of any product in Black & Decker history.

## Dustbuster Hits Home

Dustbuster’s impact on the marketplace was huge. It changed the entire hand-held vac category. In fact, it pioneered an entirely new category of cordless v...
Good Design is Good for Business, but Not Job Security

Late in 1983, Black & Decker announced it had acquired GE’s Housewares Operations for $300 million. The deal was finalized in November 1984. Within the year, marketing, engineering, and design departments all relocated to Bridgeport, CT and merged with the former GE employees under the name of Black & Decker Household Products Group (HPG). The designer of the Dustbuster, Carroll Gantz, was promoted to Director of Industrial Design, reporting to Marty Schrock, VP of Engineering. Within a year, a new headquarters was established in Shelton, CT. Then, in January 1986, Black & Decker replaced its top management executives, including those in Shelton. Management of the Household Products Group was transferred from Black & Decker people to ex-GE people, who outnumbered the former five to one. Within six months, both Steve Britt and Marty Schrock lost their positions, industrial design was transferred to the Marketing function, and Carroll Gantz was let go. The original design and leadership team who brought Black & Decker its greatest new product introduction to date were now pushed out due to “corporate politics.”

Despite the personal blows to the creators of the Dustbuster, sales continued to grow. By 1985, trade press reported that the hand-held vac market had grown 300% between 1981 and 1984. It was now at six to seven million units per year, 90% of which was cordless. It was the hottest category in the business, growing 157% in the last six months of 1985 alone. Black & Decker had the lion’s share of that market. In March of 1985, *Time Magazine* wrote about the Dustbuster in an article entitled, “Market Buster: the vac that roared.” In just seven years, from 1978 to 1985, Black & Decker’s worldwide household product sales grew from zero to equal to that of its established power tool business. In 1972, Black & Decker’s annual sales were $350 million. By 1987, annual sales were five times that—$1.8 billion!

Dustbuster Lives On and On

Since its introduction, the Dustbuster has been redesigned a number of times, generally to increase power, run-time, and/or dirt capacity, or to expand the range of models offered around the world.

In 1982, the Dustbuster was joined by a Dustbuster Plus model, which had five NiCad batteries, improving power and run time. The first major redesigns were introduced in January of 1986. The original Dustbuster performance was improved by adding batteries. The external appearance was modified slightly to house the extra batteries, and the exhaust vents were removed from the front surface. New graphics now added the Black & Decker logotype and decreased the Dustbuster logo size, as Black & Decker was now well established as a name in the housewares market. As late as 1986, more than six years after Dustbuster’s introduction, the Hoover Company still steadfastly shunned the cordless field because, “the questionable performance of cordless units would jeopardize its reputation as a producer of quality products.”

By 1990, with the design patent nearing expiration, the Dustbuster design was softened in form, following the design trends of the day. The handle was closed into a loop, increasing the space for batteries, and the charger nest was minimized. This latter change proved to be a mistake. As Gantz’s team had concluded years before, people didn’t want to see a dirty, unattractive nozzle stored on their walls. In 1992, this change was

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remedied when the charger nest was restored to hide the nozzle tip. The standard Dustbuster was now called the Classic Dustbuster with an open handle, like the original; and the previous Dustbuster Plus now was being called the Super Dustbuster. It retained the closed loop handle for visual differentiation. By 1999, the form was softened further, and the new generation of rechargeable batteries was designed to allow replacement when they lost the ability to recharge efficiently, usually after a period of five to seven years. This model generated 7.2 Volts. In 2001, Black & Decker introduced a mini-Dustbuster, that weighed in at 3.5 Volts. The mini had styling that was in tune with current design trends—very organic and playful in character.

Many unusual, off-beat Dustbuster designs have appeared over the years, including some that looked like cows, dogs, and zebras. Most were imaginary, but the “Cowbuster” was actually on the market. In 1995, an original model of the 1979 Dustbuster was acquired by the Smithsonian and placed in the National Museum of American History along with Edison’s first light bulbs and Alexander Graham Bell’s first telephones. At this point, 100 million Dustbusters had been sold! Dustbusters have become a part of our culture and are often mentioned on TV and in movies. Tiny toy Dustbusters were sold in toy stores. And one of the great truisms learned by children is, “Never hold a Dustbuster and a cat at the same time.”

As of the 30th anniversary of its market debut in 1979, total Dustbuster sales are estimated at 150 million units. That’s half again more than the total number of Volkswagen Beetles sold to date. This calculates out to about $6 billion in sales for Black & Decker. Now that’s using design and innovation to clean up in the market place!
Notes:

2. Gantz, Carroll. Telephone interview with Steven R. Umbach. 2 October, 2009
5. Ibid.

References/Sources

Hoover History:
http://www.ohiohistorycentral.org/entry.php?rec=906

Black & Decker History:
http://www.blackanddecker.com/CustomerCenter/Company-Information.aspx
http://www.wikinvest.com/stock/Black_&_Decker_(BDK)
http://en.wikipedia.org/wiki/Black_&_Decker
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It’s the goal of Catalyst to capture design’s legacy and inspire design’s future.

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2009 Catalyst Review Panel

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Panel members are recused from reviewing nominations with which they have any affiliation.

Credits

The Dustbuster Story: How Black & Decker Moved from the Basement into the Kitchen and Cleaned Up in the Market Place

Written by Carroll Gantz, FIDSA and Steven R. Umbach, IDSA.

Special thanks to Carroll Gantz and Black & Decker for their time and cooperation.

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