pwc.com/industrialmanufacturing

Customer Collaboration Designs Excellence

Industrial Products

Industrial Manufacturing

The second installment in our Manufacturing Excellence series.

pwc

What would you like to grow?

It's a given that a business needs to focus on its customers. But how does this work in practice for industrial sectors, where customers aren't consumers, but businesses?

In this paper we take a look at how manufacturing companies are collaborating with customers to build relationships and revenue. They're using a variety of techniques to understand customers better, both individually and in groups.

They're helping them improve efficiency – and document the environmental impact. They're reaching across the supply chain and working to understand how their customers' customers – consumers – impact decision-making. And in meeting customer needs better, everywhere customers are located, manufacturers are also improving their own products and cutting costs.

We think the principles can work for companies of all sizes and can potentially drive both incremental increases and step changes in efficiency.

Understanding your customer plays a vital role in making R&D more effective

Getting to know your customer base

In some cases, the process starts by looking at the entire customer base. Some manufacturers are now taking an approach which collects data from many of their customers, analyses it, and uses the results to drive design innovations. Not everyone agrees on the best way to collect and interpret customer data. For example, market research firms Applied Sciences and Strategyn each argue for the superiority of their proprietary methodology. Both agree, though, that understanding the customer plays a vital role in making R&D more effective.

In working with manufacturers, we've seen that it can be very difficult to find the right balance between meeting the specific needs of individual customers and being able to produce and sell efficiently, keeping costs down and growing margins.

2500

Number of customers Ingersoll Rand surveyed when developing a new series of air compressors.

Fortunately, in many cases customers have similar needs. That means an industrial manufacturer can be responsive, while still keeping a handle on costs.

Ingersoll Rand (IR) is one example of a manufacturer that is doing its homework. When IR introduced new R-Series rotary screw air compressors and C-Series centrifugal air compressors in early 2010, the updated versions were the result of extensive research on customer needs.[1] IR surveyed 2,500 customers in the US, UK, Germany and China to understand how customers used the products to solve problems or create value. And IR is using a similar strategy on other product development projects too.

Looking at your customer's industry sector

Emerson Electric (Emerson) is also looking to tailor its development process to customers, but the company is taking a somewhat different approach. Emerson's focus on customers begins with understanding some of the challenges faced by a particular industry sector, with energy as one example.

In an analyst presentation, the company talks about some key issues faced by the petroleum industry.[2]

Emerson describes these key customers as facing increasing complexity, as plants become larger, single facilities become integrated complexes, and process automation technology accelerates.

At the same time 40% of US petroleum workers are nearing retirement, new plants are being located in areas where there is a lack of experience, and years of experience are required to make risk decisions. Emerson's response is to use what the company calls a "Human Centered Design development process." If employees aren't as skilled, then removing some of the complexity of using technology can help them do their jobs better. And when experience is lacking, embedding specialised knowledge within the solution can help customers overcome some of their staff challenges.

Gardner Denver, a global manufacturer of industrial compressors, blowers, pumps, loading arms, and fuel systems, saw that solar panel manufacturers were having problems with pumps that used lubricant. Loss of the vacuum seal during the lamination process for solar panels sometimes caused air bubbles, a serious quality problem. They also listened to customers who said they needed a pump with greater capacity and reliability. The result was the solar screw system 1000 two-stage dry vacuum screw pump, which can produce more solar panels quicker, using less energy than the competition.[3]

We believe understanding and responding to what's happening in your customers' industry is a vital stepping stone to providing the value they are looking for – both in product manufacturing and related service offerings. We explore this in more detail in the next few sections of this paper.

1 Steve Minter, "Ingersoll Rand Puts Customers First in Drive for Innovation," Industry Week, March 10, 2010). Accessed at http://www.industryweek.com/articles/ingersoll_rand_puts_customers_first_in_drive_for_innovation_21314.aspx?Page=1
2 Steve Sonnenberg, "Emerson Process Management", (presentation presented at the Emerson Investor Conference, February 3-4, 2011). Accessed at http://www.emerson.com/en-US/about/investor-relations/Pages/default.aspx
3 "Helping the world go green," Gardner Denver corporate website. Accessed at http://www.gardnerdenver.com/Careers/Helping_the_World_Go_Green.aspx

Shifting the focus from price to long-term value through enhanced service offerings

Business models in the manufacturing sector are changing. In the past most revenues came from the production of components or end products. Now some companies also earn a significant amount from offering services and solutions – and the trend is upwards. As industrial manufacturers look to serve customers better, many are now helping with training, installation, on-going monitoring, maintenance, or refurbishment of the products they sell. In the process they're shifting the focus from price to long-term value. And some are even looking to support customers more broadly. GE, one of the biggest US industrial companies, announced in its 2010 annual report that the company plans to expand service (and software) offerings above and beyond the company's installed base. GE says "we believe there is a $100 billion opportunity in software and services in infrastructure markets we know well."[4]

In the A&D sector, some companies are already relatively far along this road. Engine-maker Rolls-Royce now generates more than half of its revenues – over 5.5 billion GBP – from service activities. That number reflects a ten percent compound increase over the past ten years.[5]

> *"We work closely with customers to align service packages."*
>
> Tony Wood,
> President – Services, Rolls-Royce Plc

How much potential revenue is out there? One UK trade organisation estimates that on average 12% of UK manufacturers' revenues are generated from services, although the specific percentage varies by sector.[6] While not every sector may be able to reach the 50+% proportion seen at Rolls-Royce, that still leaves substantial room for growth. In fact, in the UK some observers are stressing the urgency of promoting "manu-services" and are calling for greater government support of the sector.[7]

We believe a strategy which includes enhanced service offerings may be most vital for companies in "higher-cost" manufacturing territories. Our case study of Keenan System is a case in point (see *Helping customers, and the planet: how Keenan is revolutionising dairy farming*). Ireland is not a low cost territory for traditional manufacturing. By developing a valuable services model alongside the traditional manufacturing model, Keenan has offset the higher cost of manufacture with a profitable services revenue stream.

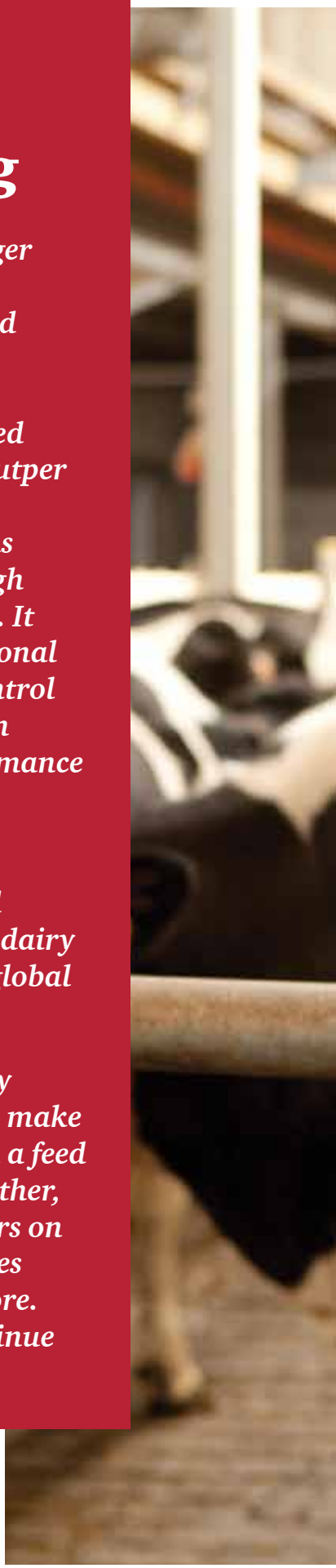
4 General Electric Company Annual Report 2010, online version. Accessed at http://www.ge.com/ar2010/
5 "Our Consistent Strategy," Rolls Royce Group plc Annual Report 2010, online version. Accessed at http://www.rolls-royce.com/reports/2010/businessreview/services.shtml
6 Manufacturing Advantage: How Manufacturers are Focusing Strategically in an Uncertain World, eef – The manufacturers' organization and BDO, November 2009.
7 Andrew Sisson, "More than making things: A new future for manufacturing in a service economy" the work foundation, March 2011. Accessed at http://www.theworkfoundation.com/assets/docs/publications/284_More%20than%20making%20things.pdf

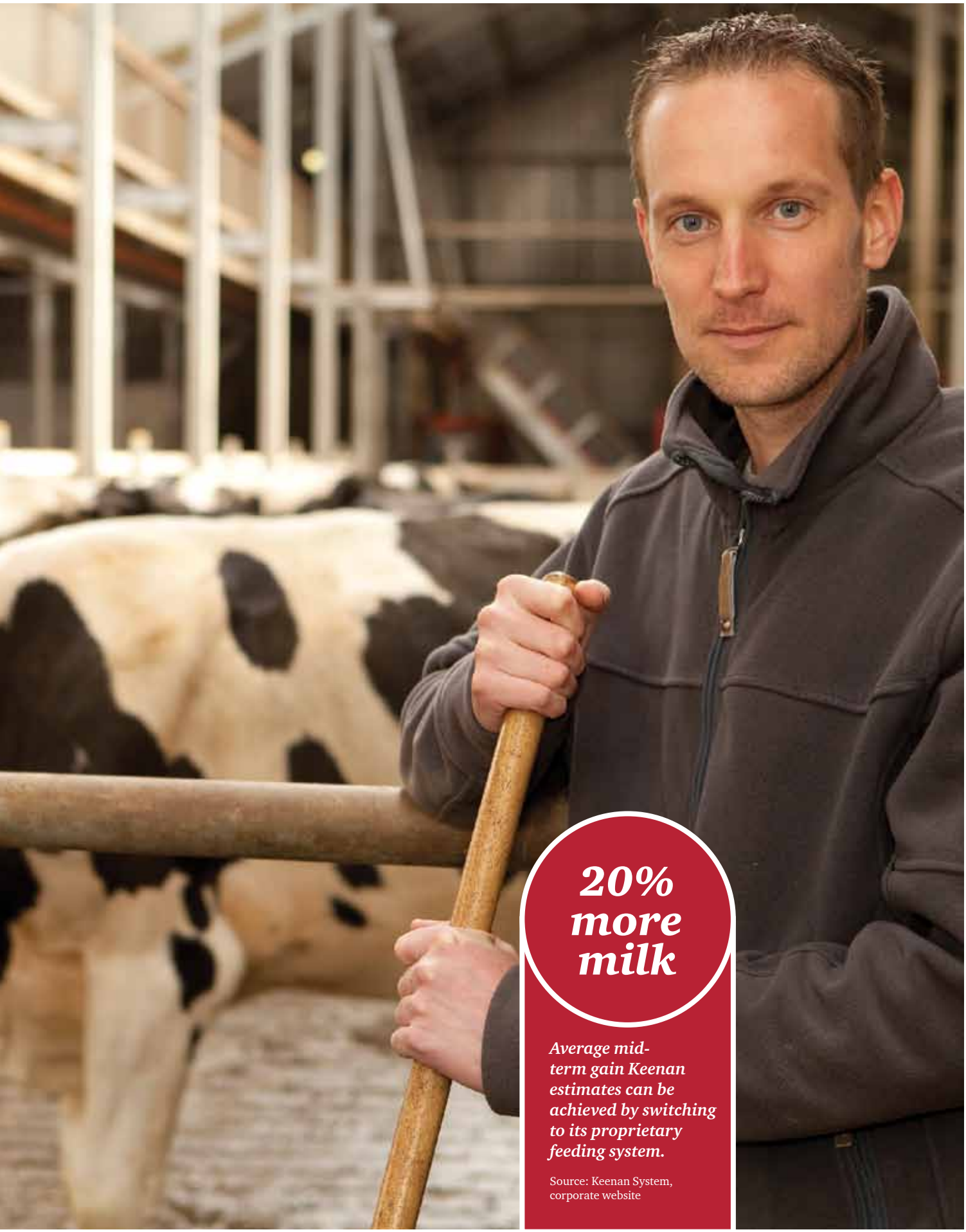
Helping customers, and the planet: how Keenan is revolutionising dairy farming

Innovation isn't confined solely to big companies with even bigger R&D budgets. Keenan System, an agricultural equipment manufacturer, is a case in point. The Irish group was established around 30 years ago; its revenues have ranged from 40-60m€ in recent years. Those numbers may skyrocket, though, if the company is able to reach the world dairy market. Keenan started by understanding a customer need. They tracked the milk outputper per unit of feed (known as feed conversion efficiency) of their machine customers. They then developed innovative feedwagons that help improve the nutritional efficiency of dairy feed through a patented process. The company has gone one step further, too. It also offers customers comprehensive support, including nutritional advice, through its patented Performance Acceleration and Control Enhancement (PACE) Information Technology. The PACE system monitors optimum feed rations that consistently deliver performance to agreed production targets. PACE users can even track and benchmark their herds' performance.

What's the bottom line? Potentially a 20% improvement in feed efficiency, which means a dramatic increase in profitability for dairy farmers. It's also good for the environment. At a national and global level, the potential accumulated economic potential is massive.

And it gets better. Keenan's equipment and feeding methodology achieve great results, but using the best possible mix of feed can make them even better. That's why the company is collaborating with a feed company to provide the optimal physical rations. Working together, the feed company and Keenan offer the "Gain Plan" to customers on 12 month contracts. By partnering, Keenan is able to access sales territories and farmers it wouldn't have been able to reach before. They're also building a customer support network, to help continue the collaboration with customers.





20% more milk

Average mid-term gain Keenan estimates can be achieved by switching to its proprietary feeding system.

Source: Keenan System, corporate website

Helping customers improve their sustainability profile

One of the most important ways that industrial manufacturers can deliver long-term value to customers is by helping them increase their sustainability. In many cases, new equipment or machinery can make a major difference to reducing the carbon footprint, by enhancing energy efficiency, and/or reducing emissions.

Measuring energy efficiency is straightforward, and for many industrial manufacturers, demonstrating the energy savings that customers can achieve (and resultant emissions benefits and cost savings) may be sufficient. Environmental life cycle analysis (LCA) goes one step further, and demonstrates the embedded carbon, waste or water inherent in the entire production process and supply chain of particular products.

35 times

Estimated payback of a wind turbine over its lifetime, using LCA.

Source: Vestas Wind Systems corporate website

Such an analysis allows companies to evaluate competing solutions – and we believe it can be another way of demonstrating the importance of focusing on long-term value, rather than initial price. For example, if a pump-maker can demonstrate that their pumps are both produced more efficiently and deliver a better outcome (litre of water shifted) than the competition, they may be able to make a strong case for a price premium. We've found that doing a detailed analysis of one or two "flagship" products may be less daunting than trying to track the performance of the entire product portfolio, and may still provide information that can help customers understand the value created.

In some sectors, like chemicals, LCA is becoming increasingly common. There are challenges, though. In order to be reputable, LCA needs to be peer-reviewed. In helping our clients approach the LCA process, we've found that performing one requires a thorough understanding of the entire supply chain, from raw materials to waste disposal – including the needs of your customer. It's also important to understand how customers compete in different markets, what the competition is offering, and where demonstrating a sustainability advantage can make a real difference.

In our view, even if LCA isn't the right solution, the holistic approach it fosters points to the advantages of collaborating with customers (and supply chain partners too).

We know from working with a number of industry associations in the manufacturing sector that there is increasing interest, at a sector level, in developing LCA-based product carbon footprints, and sometimes full LCAs, for particular product types. This is because manufacturers collectively recognise that these data are needed to support their products in the market place against the environmental credentials of competing products.

Building greener

Consider the construction and building products industry. As governments look to decrease greenhouse gas emissions, they are increasingly eyeing the built environment. Improving the energy efficiency of homes and commercial properties can have a significant impact on overall emissions levels. But making it happen isn't always straightforward, especially when human behaviour enters the picture. For residential building, consumers must be willing to pay the initial premium that some kinds of "green building" represent, or put up with the investment and inconvenience that go along with refurbishments.

The situation may be simpler in commercial buildings, which face much greater energy costs, and correspondingly bigger potential savings.

Industrial manufacturing companies are already developing a whole range of products to help. They're improving heating, cooling and ventilation (HVAC) systems, and lighting solutions. They're automating building management to decrease energy usage. They're developing smart energy solutions to allow the use of renewable power sources. All of these types of solutions show the importance of aligning R&D efforts with the use of the product – and potentially supporting customers during its

entire lifetime. While it makes sense to produce such systems as efficiently as possible, looking over the product lifecycle, the biggest potential for emissions savings is clearly during the use phase.

In the UK PwC recently worked together with the Construction Products Association to survey its membership. Over a hundred sector executives responded, and a majority saw great opportunity in the development of products which promote energy efficiency, in particular for the building refurbishment market.

It's been estimated that 87% of the buildings currently in use in UK will still be in use in 2050.[8] That means refurbishing existing stock is actually a larger opportunity than new building. It's also an area where industrial manufacturers can make a big difference.

Helping your customer serve consumers

Looking across the supply chain is vital in other sectors too. While industrial manufacturers are providing solutions to commercial customers, in many cases how consumers use products may also have a big impact. Take the Forest, paper and packaging sector, which is currently going through a period of intense change. Demand for paper is changing radically as consumers increase their use of digital media. That's changing the needs of paper manufacturers.

While in the past a paper machine producing only one grade of paper may have been perfectly adequate, or even more efficient, shifting consumer demands mean paper makers need greater flexibility – and that means they need paper machines which are able to switch which grades they produce. And while consumer demand for many types of paper is declining in mature markets, in emerging markets, some segments are growing rapidly – for example, tissue, which is used in hygiene products. Metso Paper is one company that has responded to this customer need. They've designed a new low-cost tissue machine specifically for use in emerging markets.[9]

The machine helps paper producers add incremental production where it's needed – close to the consumers in growing markets.

For packagers, the ability to tailor the exact attributes of a particular solution to the customer is becoming critical too. That also means understanding how consumers react to different materials, what recycling systems are in place in different markets, etc. As we've argued in a previous publication, which packaging solution is the most "sustainable" may vary widely, subject to local market conditions.[10]

8 David Adamson. CSD Working Papers Series 2009/2010 – No.2. Building for the Future – Design of Sustainable Buildings to Combat Climate Change. Accessed at http://www.uclan.ac.uk/schools/built_natural_environment/research/csd/files/Working_paper_2_Sustainable_Buildings_Adamson.pdf

9 "A new tissue machine for the developing markets". Metso corporate website. Accessed at http://www.metso.com/corporation/articles_eng.nsf/WebWID/WTB-041125-2256F-D31B5

10 "Sustainable packaging: threat or opportunity?" PwC, 2010.

Helping customers, and the planet

One-on-one collaboration provides clear, actionable feedback

We've talked about the need to understand customer groups or industries – but what about the needs of individual customers? Working directly with major companies can be an extremely productive way of driving innovation. As just one example, ABB pilots major design changes with key customers as a way of testing and improving them. When the company was looking to improve its high performance drive systems, for example, it solicited the help of a leading elevator maker in Italy.[11] That helped the company understand which features worked well, and which ones needed improvement – and generate visionary ideas for future innovation too.

From a sustainability perspective, we see the ultimate goal as achieving a true step change in efficiency. One-on-one collaboration, where manufacturers and their customers jointly develop a solution that is less resource-intensive, is one route to that goal, although it's by no means the only one, as our case study of Keenan System suggests.

Using collaboration with customers to cut costs and increase efficiency

There are many ways to cut manufacturing costs – Six Sigma, Lean, etc. Value Analysis/Value Engineering (VAVE) doesn't get as much press as some of these other approaches, but it can be a good choice for companies who want to integrate their customers (and suppliers) into the cost reduction process. VAVE stands for a system of identifying and prioritising product functions, analysing their contribution to overall value and relative cost, and spotting areas for improvement.

We introduced one of our clients, a maker of pipes, valves and control equipment, to VAVE in 2010. The company was looking to update its product portfolio and trim costs. Together with the client, we set up workshops with their supplier network to work through the VAVE process – and we included customers too. That's because engineers may not always be the best judge of which functions really bring customers the most value. Getting input directly from the people using the equipment helps to validate planned changes – and sometimes turns them on their head. It also underlines the importance the company places on meeting customer needs cost-effectively.

The result of our efforts? Significant opportunities to improve on bill of material (BoM) spend – the average savings across the products reviewed was 30% of BoM costs – without jeopardising customer or supplier relationships.

Regardless of what methodology is used for cost cutting, these initiatives usually increase efficiency. But how often are resource efficiencies matched by adequate measurement and tracking of the carbon dividend? It stands to reason that removing resource, cost, time and people from a manufacturing process may, in many cases, bring with it improvements in the carbon profile of the good produced or the service supplied. Customers are increasingly interested in this aspect of performance. We think it makes sense to consider measuring and documenting it.

Collaborating across the globe

In the first paper in our manufacturing performance series, we talked about the importance of emerging markets to the industrial manufacturing sector. We noted that many manufacturers are moving R&D operations to these markets in order to be closer to customers. We believe this trend will continue, as a strong local presence can enhance the process of customer collaboration. And while the BRICs are a great place to start, the so-called VISTA countries (Vietnam, Indonesia, Singapore, and Thailand) offer promise as well. Thinking through where plants and research facilities should be located is complicated. So taking time to find the right site is a key step in the process.

It's not always necessary to be physically proximate to collaborate, though. As cloud computing and virtual collaborating technologies improve, the opportunities to work together are expanding exponentially (see *Using new technologies to collaborate with customers*). At PwC, we work with clients across a wide range of industries. We're seeing first-hand that enterprises need to adapt their business models and operations to meet the enhanced expectations of the Digital Consumer and ecosystem. While manufacturers don't usually interact directly with consumers, we've already shown they have a major impact on what gets made. There are also lots of opportunities to make internal changes that can help companies collaborate more effectively with all of their customers.

11 Peter Lindgren, Jari Suntila, Ilpo Ruohonen "No step without the customer: How customers are instrumental in product development." ABB corporate website. Accessed at http://www02.abb.com/global/gad/gad02077.nsf/lupLongContent/1F1EC51FF0CDA345C1257345002E0A34

Using new technologies to collaborate with customers

System engineering and design is complicated, and project implementation has always required close cooperation with customers. Power and automation technology company ABB now uses ABB TeamNet to facilitate the process.[12] The new system-based concept lets ABB and plant customers access ongoing control systems and design projects via a dedicated and secure website. Better communication means fewer errors caused by late, inconsistent or misinterpreted data.

What's the way forward?

Some manufacturers are already taking steps to increase their levels of collaboration with customers. We believe this type of approach will be fundamental to innovating smarter and developing a sustainable manufacturing business for the future. Companies who fail to collaborate with their customer may face loss of market share, more difficult routes to market, and challenges in maintaining recurring business.

Quantifying results will be important too. One good choice may be life cycle analysis to document the environmental impact of products designed with the customer in mind. And Cradle to Cradle design actually puts re-usability at the heart of the design process. Companies will also need to understand how to work together with customers around the globe. That could mean establishing or increasing a presence in new markets. For many, rethinking and redesigning their company's use of digital technologies can also help jump-start collaboration efforts and enhance customer relationships.

We've focused on customers in this report, but looking at the other side of the coin is important too. That's why the next volume of this series will share ideas about collaborating with suppliers.

Want to work more closely with your customers to drive innovation and build revenues? You may need to ask yourself and your team some key questions first:

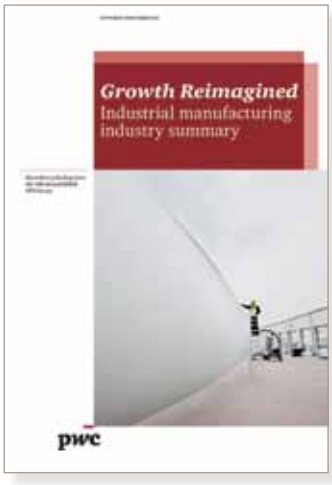
- *What problems are your customers trying to solve? Are they unique, or shared with other companies or a whole industry sector?*
- *Would partnering with another supplier help you bring more to the table?*
- *How are you reaching out to new customers? Have you considered using strategic partnerships in new geographies to help understand them better?*
- *Do your customers understand how your products can help them improve their environmental footprint? How can you work together to increase sustainability?*
- *Do you fully understand the impacts of any cost-cutting initiatives on your customers? Have you integrated them into the review process to make sure you're not cutting corners on features your customers actually value? When your cost-cutting efforts bring sustainability gains, are you documenting and sharing them with customers?*
- *Not every customer is open to changing their standard way of doing business, or even their whole business model. How will you identify the right customers to collaborate with?*
- *Does your digital infrastructure support customer collaboration? Are you taking advantage of new technologies?*

12 "ABB TeamNet improves project collaboration for control systems" ABB company press release, May 18, 2010. Accessed at http://www.abb.it/cawp/seitp202/b63179288adef3a885257720005463cd.aspx

Further reading

Capturing growth markets

In the 80's and 90's, many companies looked to the emerging markets for low-cost sourcing. Now they are looking to places like China as important markets in their own right. We highlight some examples of manufacturers who are already building plants, working with local partners and governments, conducting research – and most importantly, generating significant sales – in some key emerging markets. We take a look at why they've been successful, and what we think is likely to happen next.



14th PwC CEO survey: Industrial manufacturing sector summary

In 'Growth reimagined: Prospects in emerging markets', we show how CEO confidence is being driven by targeted investments in particular emerging markets – often far from home. Like their peers in other sectors, industrial manufacturing CEOs have renewed confidence in their companies' growth prospects. They honed their cost-cutting skills during the recession, patiently waiting for the time when global growth would return.

Manufacturing barometer

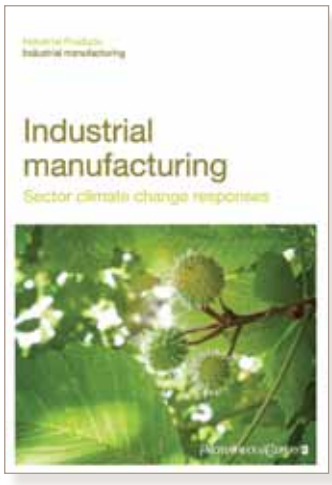
Given today's economic conditions, this window on the views and expectations of other executives will help you to understand what your peers are thinking, and how they are responding to current business issues. Every quarter, the Manufacturing Barometer surveys US-based senior executives from multinational manufacturing companies regarding their view of the US and global industrial manufacturing economies over the past quarter and their outlook for the next 12 months.

Assembling value

Assembling value is the PwC quarterly analysis of mergers and acquisitions in the global industrial manufacturing industry. In addition to a detailed summary of deal activity in each quarter, we supplement each issue of Assembling Value with a special report looking at the impact of wider industry challenges on the strategic deal environment.

Never waste a good crisis

Business leaders have taken their companies through unprecedented times recently and now face new challenges in embedding the lessons learned and driving for growth in a rapidly changing environment. In this report we show how some leading players in the Industrial Manufacturing sector have used the period to adapt and strengthen their businesses providing lessons for those tackling their own particular stage of the cycle.



Different shades of green

In this short paper we look at the state of the climate change agenda post Copenhagen and the business implications for Industrial companies. The accompanying manufacturing sector supplement gives some background on the current state of the sector followed by an analysis of top sector companies and their responses to climate change issues based on publically available information.

Global Industrial Manufacturing team

Graeme Billings
Global Industrial Manufacturing Leader
graeme.billings@au.pwc.com
Tel: +61 3 8603 3007

Erica McEvoy
Global Industrial Manufacturing Marketing & Knowledge Management
erica.mcevoy@au.pwc.com
Tel: +61 3 8603 4827

Global Industrial Manufacturing Industry Group

The Global Industrial Manufacturing Industry Group at PwC includes over 9,300 professionals who are committed to serving the Industrial Manufacturing industry. It is part of an Industrial Products group consisting of over 32,000 professionals, including over 17,000 providing Assurance services, 8,300 providing Tax services, and 7,000 providing Advisory services.

Our group is dedicated to delivering effective solutions to the complex business challenges faced by industrial manufacturing companies. As a global leader in serving the industry PwC has extensive experience working with companies on industry-specific strategic, operational, and financial issues.

Our expertise includes assurance, tax and advisory services, as well as specialised capabilities in regulatory compliance, risk management, performance improvement and transaction support. In helping our clients, we draw on the full knowledge and skills of PwC's professionals.

Territory Industrial Manufacturing contacts

Australia
Graeme Billings
graeme.billings@au.pwc.com

Canada
Calum Semple
calum.k.semple@ca.pwc.com

Central and Eastern Europe
Matt Pottle
matthew.pottle@cz.pwc.com

China
Malcolm MacDonald
malcolm.macdonald@cn.pwc.com

Finland
Urmas Rania
urmas.rania@fi.pwc.com

France
Edouard Sattler
edouard.sattler@fr.pwc.com

Germany
Martin Bork
martin.bork@de.pwc.com

India
N.V. Sivakumar
n.v.sivakumar@in.pwc.com

Ireland
Alisa Hayden
alisa.hayden@ie.pwc.com

Italy
Gianluca Sacchi
gianluca.s.sacchi@it.pwc.com

Japan
Shigeru Shiina
shigeru.shiina@jp.pwc.com

Korea
Jae-Eun Lee
jae-eun.lee@kr.pwc.com

Luxembourg
Mervyn Martins
mervyn.martins@lu.pwc.com

Malaysia
Thaya Sangara Pillai
thaya.sangara.pillai@my.pwc.com

Mexico
Hector Rabago
hector.rabago@mx.pwc.com

Middle East
Alistair Kett
a.kett@ae.pwc.com

Netherlands
Alexander Staal
alexander.staal@nl.pwc.com

Russia
John Campbell
john.c.campbell@ru.pwc.com

South Africa
Diederik Fouche
diederik.fouche@za.pwc.com

South and Central America
Marcos Panassol
marcos.panassol@br.pwc.com

Spain
Julio Balaguer Abadia
julio.balaguer@es.pwc.com

Sweden
Olof Enerbäck
olof.enerback@se.pwc.com

Switzerland
Stephan Raebsamen
stefan.raebsamen@ch.pwc.com

Taiwan
Gary Chih
gary.chih@tw.pwc.com

United Kingdom
Chris Baker
chris.baker@uk.pwc.com

United States
Barry Misthal
barry.misthal@us.pwc.com

pwc.com/industrialmanufacturing

We thank a number of partners and staff at PwC for their contributions to the research, writing and management of this publication.

This document is printed on heaven 42. heaven 42 is an environmentally responsible paper manufactured using Elemental Chlorine Free (ECF) pulp sourced from certified, well managed forests.
heaven 42 is Forest Stewardship Council (FSC) Chain of Custody (CoC) certified (mixed sources).