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Global Design Strategies for Industrial Equipment Manufacturers

Once primarily thought of as a cost-cutting program, global design initiatives have matured significantly over the last two years. As companies have begun to recognize the benefits of global design chains, it is a concept that's matured, shifting from simply a labor cost saving tactic towards a more fully realized and sophisticated business model focused on rapid product innovation and long-term growth. By contrast, industrial equipment manufacturers are relative latecomers to global design, with one-third of these companies reporting global initiatives that are less than a year old. As such, they report a tighter focus on cost concerns as well as less effective coordination and management of the kind of infrastructure to support these design programs. These companies have the opportunity to learn from the experience of other manufacturing industries with more mature global design processes in place.

Factors Driving Global Design

Aberdeen Group's December 2005 *Global Product Design Benchmark Report* found that 79% of study participants were turning to global design chains primarily to reduce costs. Aberdeen revisited the topic in October 2007 with *Profitable Design Chains: Global Product Design Comes of Age* and found the focus on global design solely to alleviate cost pressures had reduced significantly (46% of respondents), while market demand for rapid product development (47%) has risen to become the top pressure driving companies to global design models (Table I).

Table I: Top Pressures Driving Global Design

Pressures	Industrial	All Respondents
Cost pressures from customers	47%	46%
Strategy to expand sales into global markets	37%	32%
Market demand for rapid product development	30%	47%

Source: Aberdeen Group, October 2007

Manufacturers operating within the industrial equipment sector, however, indicate a significant focus on reducing costs (47%). Demand for rapid innovation falls to a third place concern, reported by only 30% of these companies, behind a strategy to expand sales into global markets (37%).

Sector Insight

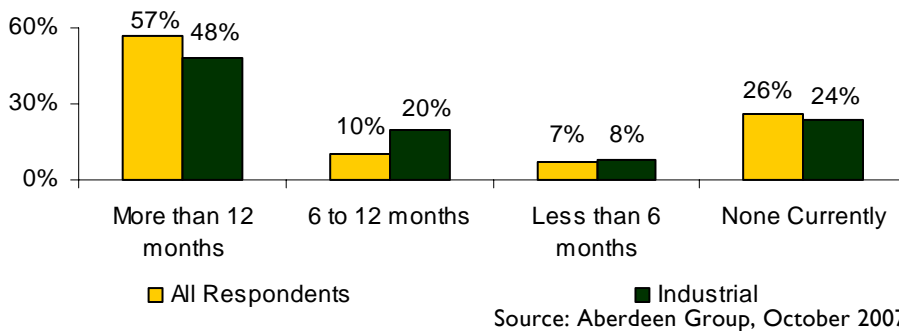
Aberdeen's Sector Insights provide strategic introspective and analysis of primary research results by industry, market segment, or geography

Sector Definition

For the purposes of this study, respondents who indicated that they operated within the industrial equipment manufacturing industry were isolated and aggregated for comparison against peer manufacturers across industries in Aberdeen Group's performance framework.

In part, these differences may be related to the relative immaturity of global design initiatives among industrial equipment companies. Interestingly, industrial equipment manufacturers are somewhat latecomers to global product development. About three-quarters of these companies (76%) report that they have a global design strategy in place. While this is on par with respondent in other industries, 28% of industrial equipment manufacturers report initiatives that have been in place for less than a year (Figure 1).

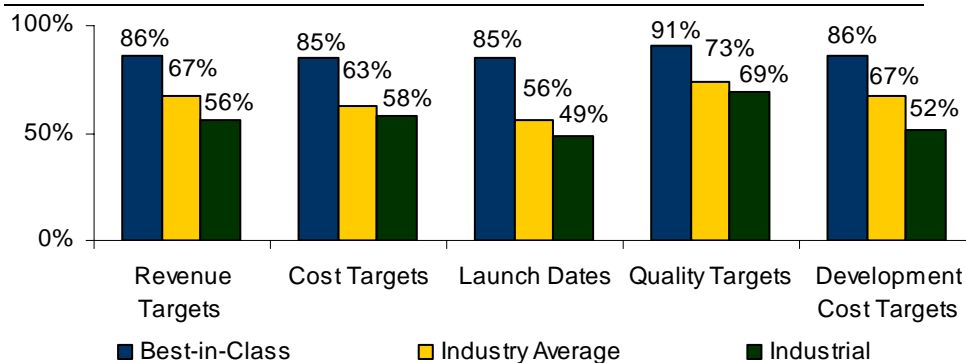
Figure 1: Maturity of the Global Design Program



Aberdeen Analysis

During September and October 2007, Aberdeen examined the global design strategies of more than 170 enterprises. To gain an understanding of how manufacturers' can best take advantage of global design chains, respondents were benchmarked according to their performance across five key performance indicators and divided among three performance categories: the Best-in-Class (top 20% of performers); Laggard organizations (bottom 30%), and the Industry Average (the remaining 50%). These measures included the percent of products meeting targets for revenue, cost targets, product launch dates, quality targets, and overall product development costs – determined to be metrics that drive product profitability. Industrial equipment manufacturers fall behind the Industry Average in each one of these measures (Figure 2), leaving significant room for performance improvement.

Figure 2: Performance Framework



The Competitive Framework Key

The Aberdeen Competitive Framework defines enterprises as falling into one of the three following levels of practices and performance:

Best-in-Class (20%) — practices that are the best currently being employed and significantly superior to the industry norm

Industry Average (50%) — practices that represent the average or norm

Laggards (30%) — practices that are significantly behind the average of the industry

Designing industrial equipment is challenging, and the performance indicates those challenges. The most dramatic performance gaps between the Industry Average and industrial equipment can be seen in the ability to meet product revenue and development cost targets. Given the high pressure they face regarding cost, the fact that they only meet direct product cost targets 58% of the time is a concern. Coupling that with hitting revenue targets only 56% of the time, their ability to hit their target margins is very strained. The good news is that they are not as far behind in quality. Poor quality can mean profit loss during the service lifecycle, but while on par with the Industry Average, 69% leaves room for improvement.

Strategic Actions

The strategic actions that industrial equipment companies report taking as part of their global design initiatives tend to align with the greater trends that Aberdeen found across all industries; with a greater focus on leveraging flexible design capacity (Table 2).

Table 2: Top Strategies of Global Design

Strategic Actions	Industrial	All Respondents
Leverage high talent, low cost design resources from global workforce	48%	51%
Increase design capacity beyond currently available local resources	36%	32%
Leverage third party engineering to add flexible design capacity as needed	30%	21%

Source: Aberdeen Group, October 2007

As with respondents across all industries, industrial equipment manufacturers turn to global design chains in order to take advantage of high talent, low cost resources from the global workforce. Doing so, for them, is more about increasing design capacity beyond what is currently available and taking advantage of a flexible workforce than it is for other industries. This focus makes sense given the project nature of how many of these companies do business, which can result in large swings in the need for design resources. Outsourcing this work globally can allow them to keep resources "on tap" for when they are needed, but not when orders are at a low.

The Challenges of Global Design

While turning to a global workforce can provide the opportunity to lower costs while providing a flexible workforce, it is a strategy that comes with a number of its own challenges that further complicate product development (Table 3).

Table 3: Top Five Challenges of Global Design

Challenges	Industrial	All Respondents
Protecting Intellectual Property (IP)	66%	61%
Retaining company knowledge of products or product design decisions	52%	44%
Coordinating distributed projects and people	36%	31%
Making existing product knowledge available for learning and for reuse	34%	27%

Source: Aberdeen Group, October 2007

Protecting product Intellectual Property (IP) is the top challenge reported by industrial equipment manufacturers, consistent with other industries. Regardless of the products developed, keeping critical design information is an inherent problem when entering into design collaboration with partners, as leveraging outside help puts sensitive product data at risk by its nature. It is a problem that intensifies as manufacturers attempt to leverage design resources from regions that may not respect the same IP laws as their own country. Copycat products, particularly ones that can be manufactured less expensively, can reduce market share and erode margin advantages derived from innovation, making IP protection critical.

Where industrial equipment companies are more challenged than other industries is with retaining company knowledge of product and design decisions. There is a lot of "tribal knowledge" in industrial equipment design with undocumented information about designs and manufacturing that is harder to capture for use across a global business. Not surprisingly, then, they are also more challenged when it comes to making this information available for reuse in other designs and keeping distributed projects and people coordinated.

The Three Pillars of Effective Global Design

Aberdeen's October 2007 [*Profitable Design Chains: Global Product Design Comes of Age*](#) report identified three key themes to how the Best-in-Class address the challenges of global product development. Aberdeen found the Best-in-Class set themselves apart from their peers with the ability to:

- Protect product intellectual property
- Design in parallel
- Coordinate the global design team

The Best-in-Class have the capabilities in place that allow them to overcome their challenges and more effectively take advantage of distributed design resources.

Protect Intellectual Property

Consistent with the fact that this was their top area of challenge, reported by 66% of industrial equipment manufacturers, protecting product IP is an area that these companies have gone to the greatest lengths to attempt to improve. They report adoption of the capabilities common to how Best-in-Class protect IP at about the same level as the Industry Average (Table 4).

Table 4: The Competitive Framework - Protecting IP

	Best-in-Class	Industry Average	Industrial
Sharing varied levels of design accuracy with different partners (based on need for detail)	63%	41%	38%
Product knowledge and IP retained by company	82%	69%	70%
Digital Rights Management (DRM) / design security	41%	19%	21%

Source: Aberdeen Group, October 2007

The Best-in-Class approach to protecting IP begins with retaining sensitive product knowledge within the company. This entails a recognition that only those elements of a design that need to be shared should be shared with partners. For example, a core design aspect may not be shared in detail with partners, but kept as a protected trade secret. As a next step, these Best-in-Class companies selectively share designs at different levels of accuracy based on their partners' need for detail.

Industrial equipment manufacturers' strong adoption in these areas may result from their initial experiences with global design. Design partners in disparate regions are potentially partners in regions that provide weaker legal protection for intellectual property. In contrast to other industries, such as automotive or even aerospace and defense whose market share rests at least partially on brand recognition, profits within the industrial equipment sector rests more centrally in product functionality. A copied design can more easily be reused by a partner that can become a direct competitor. Additionally, this can impact both primary market and aftermarket revenue, which can have large margin impacts.

However, while they exceed the Industry Average in these areas, industrial equipment manufacturers still lag the Best-in-Class, indicating further opportunity for improvement. The area that sees the greatest differentiation in its use by the Best-in-Class is not procedural, but technological. While they remain a leading edge technology, Digital Rights Management (DRM) solutions are in use by 41% of the Best-in-Class. This is twice as often as industrial equipment manufacturers. DRM restricts access to design data so that only intended recipients can access information, and can also limit what those users are allowed to do with the information (share, copy, etc.). These technologies enforce a layer of security that helps protect

proprietary information when it must be shared beyond the four walls of the enterprise.

Design in Parallel

While protecting product information, Best-in-Class companies are also improving the way that the global design team works together. To this end, they have a number of capabilities and technologies in place that enable them to take the next step and design in parallel (Table 5). Here too, industrial equipment manufacturers are ahead of the Industry Average, particularly in the implementation parallel design of different portions of the design. However, they fall behind the Best-in-Class in the adoption of many of the capabilities required to best support parallel design processes.

Table 5: The Competitive Framework - Design in Parallel

	Best-in-Class	Industry Average	Industrial
Parallel development of different portions of design across design chain	65%	30%	34%
Formal review processes with external sources throughout design cycles	71%	49%	36%
Require internal and external resources to use standard design tools	69%	49%	46%
Centralized product design data	81%	46%	51%
"Bounding box" or "interfaces" of adjacent subsystems defined	59%	26%	23%
Designers design with visibility to adjacent assemblies or subsystems (in context)	71%	51%	41%
Real-time, interactive design collaboration tools	59%	36%	33%
Design collaboration (visualization, review, markup)	76%	55%	43%
Document-based design collaboration tools	82%	62%	41%
Digital mockup	71%	54%	40%
Project collaboration tools	76%	58%	49%
Virtual meeting / collaboration tools	82%	69%	47%

"We have adopted a concurrent engineering approach, following a top-down design methodology. We provide shrink wraps or STL data of adjacent parts or sub-systems to external stakeholders, enabling them to participate effectively in the design process. This has allowed improved visualization of the entire design, error free designs, and quicker reviews."

~ Director of Operations,
Industrial Equipment
Manufacturer

Source: Aberdeen Group, October 2007

Specifically, industrial equipment companies are well behind the Industry Average in adopting formal review cycles with external resources. In fact, the Best-in-Class are twice as likely as industrial equipment manufacturers to hold partner review sessions as the design progresses. In addition, the Best-in-Class are 1.7 times as likely to give designer partners the ability to "design in context" by granting visibility to adjacent subassemblies or subsystems. This allows designers to be aware of other elements of the design that have an impact on their portion of the design, as well as those

elements that their designs impact. Similarly, they are less likely than even Industry Average companies to define rules that indicate how their design should interact with adjacent designs in regards to defined bounding boxes or interfaces. This leads to designers "stepping on" each other's designs and unnecessary rework.

Additionally, industrial equipment manufacturers also fall behind in the use of various collaborative technologies to enable teams to work together. This includes the use of real-time, interactive design tools; design collaboration and visualization tools, and project collaboration tools. These tools can help ensure that even geographically distributed teams can connect in real-time to work together much more effectively. This, in turn, means that these teams can efficiently work from each other's ideas, which ultimately leads to more innovative solutions in less time.

Coordinate the Global Design Team

Global design requires a greater degree of attention to the management of design tasks in a way that allows dispersed teams to effectively work on a common project. This is a major area of concern for industrial equipment manufacturers and contributes to their inability to achieve truly parallel product development and contributes to their reported challenges of retaining knowledge of products or product design decisions and coordinating distributed projects and people. By contrast, Best-in-Class companies approach dispersed design teams in a programmatic fashion. For example, Best-in-Class companies are twice as likely as industrial equipment manufacturers to adopt standard design processes across the global design chain (Table 6).

Table 6: The Competitive Framework - Coordination

	Best-in-Class	Industry Average	Industrial
Standard design processes across global design chain (for both internal and external resources)	71%	37%	35%
Formal project and program management across design chain	63%	55%	39%
Product Lifecycle Management (PLM)	53%	33%	25%
Product Data Management (PDM)	82%	51%	55%

Source: Aberdeen Group, October 2007

Industrial equipment companies are well behind in coordinating the team and the project in addition to coordinating the designs. This may be related to the relative immaturity of their global design initiatives. These companies are not looking at design partners as a global team (which means less central control over their resources) but also less ability to understand

“By centralizing data, everyone in the company can work on the same model at the same time. I can have a design team in the states and one in China both working off of the same data, and there is no time wasted wondering what version of the model each team is working on.”

~ Michael Hollen
Design Supervisor
Manitowoc, Inc.

performance across different teams because they are all being measured differently.

Industrial equipment's disparate design approach can be seen, partially, in how they have invested in technology to support global design. While they have invested in Product Data Management (PDM) to track the development of the product itself, many have not take that the next step to extend it to integrated processes and collaboration with Product Lifecycle Management (PLM) tools. PLM solutions typically extend this with integrated business processes and project data. In particular, the Best-in-Class are 1.5 times as likely as industrial equipment manufacturers to take advantage of PLM. This is a critical component to how the Best-in-Class are able to effectively manage global design chains. These tools manage product data, status, and process, providing a central location that keeps distributed resources in sync.

Required Actions

In order to take full advantage of their global design networks, industrial equipment manufacturers need to address the critical challenges involved in protecting IP and managing a global workforce. To this end, they need to adopt the three Best-in-Class pillars of effective global design, including taking steps to:

- **Invest in the means to protect IP.** Protecting product intellectual property was reported as the top challenge for industrial equipment companies. While they have taken the first steps necessary to keep sensitive design data safe, they need to continue on this path and invest in DRM technologies in order to enforce design security. This is a strong differentiator of Best-in-Class performance, as these companies are twice as likely as industrial equipment manufacturers to leverage DRM.
- **Enable design teams to work in parallel.** Industrial equipment companies indicate a focus on parallel product development, but must adopt both the processes and technologies that the Best-in-Class use to support it. By enabling greater communication and visibility among a dispersed team, the Best-in-Class keep designs synchronized, removing unnecessary and costly rework as teams design in parallel.
- **Coordinate the global design team.** This is the area where industrial equipment manufacturers show the greatest opportunity for improvement. Adoption of standardized design processes and implementation of PLM tools will help to allow for more efficient design processes and retain a tighter control of product and design knowledge.

For more information on this or other research topics, please visit www.aberdeen.com.

Related Research

[*The Product Innovation Agenda 2010:*](#)
December 2007

[*Profitable Design Chains: Global Product Design Comes of Age*](#) October 2007

[*Engineering Change Management 2.0:*](#)
September 2007

[*The Global Product Design Benchmark Report:*](#) December 2005

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