

Aberdeen *Group*

Send to a Friend

Multi-CAD Design Chain Benchmark Report

Insulating Engineering from Today's Multi-CAD Environment

December 2006

Executive Summary

Sharing design data. In today's business landscape of acquisitions, deep but intimate supply chains, cooperative yet competitive partnerships and customers' increasingly detailed design delivery requirements, this straightforward concept is anything but simple. Native-, neutral-, and visualization-formatted design data is flying about, but, unfortunately, practically none of it is compatible. As a result, engineering organizations spend a significant amount of time and effort translating or even re-creating design data, which results in missed launch dates and low design reuse. Yet some engineering organizations are not only coping with the issue but using their agility to differentiate themselves and win business.

Key Business Value Findings

- Top performers hit engineering product development targets on a 93% or better average compared to 55% or worse for laggards.
- Top performers reuse designs at twice the rate of laggards by making design data easier to find with data management and easier to use by being in the correct format.

Implications & Analysis

- Top performers are 63% and 90% more likely to use an insulated product development process with customers and suppliers respectively, delivering native CAD formatted design data while designing on different internal, standardized CAD tools.
- Top performers are ten times more likely to use third-party translation applications.
- Top performers are 2.5 times more likely to use engineering visualization to assemble mixed CAD design data.
- Top performers are 23% more likely to use a single data management tool and 50% more likely to use that technology to track and manage the associations that occur when designs exist in multiple formats.

Recommendations for Action

- Employ an insulated product development process with customers and suppliers.
- OEMs should outsource the translation or re-creation of design data.
- Deploy third-party translation applications to convert design data to different formats.
- Utilize engineering visualization tools to assemble multi-formatted design data.
- Implement a single data management system to manage design data of all formats.
- Use data management to associate designs in different formats to one another.



All print and electronic rights are the property of Aberdeen Group © 2006.

Table of Contents

Executive Summary i

Chapter One: Issue at Hand 1
- Inbound Multi-CAD Design Data: Making Lemonade out of Lemons? 1
- Adopting an Insulated Product Development Approach 2
- Challenges Plague the Insulated Product Development Approach 3
  - Insulated Product Development Requires CAD Specialization 4
  - Adopting Multiple or Neutral 3D Technologies for Design Re-creation 4
  - Multi-CAD Reality Complicates the Product Development Infrastructure 4

Chapter Two: Key Business Value Findings 5
- Top Performers Hit Development Targets on 93% or Better Average 5
- Top Performers Reuse Designs at Twice the Rate of Laggards 6

Chapter Three: Implications & Analysis 7
- Integrated and Insulated Product Development Processes 7
  - Insulating Product Development from Customers and Suppliers 8
  - Integrating Product Development with Partners 8
- An Organizational Enabler: Outsourcing Translation and Re-creation 9
- Technologies That Tame the Multi-CAD Reality 9
  - Leveraging Third-Party Core Competencies for Design Translation 10
  - An Engineering Job Demands Engineering Visualization 10
  - Regarding Multi-CAD Data Management: Less Is More 12

Chapter Four: Recommendations for Action 14
- Laggard Steps to Success 14
- Industry Norm Steps to Success 15
- Best in Class Next Steps 15

Appendix A: Research Methodology 16

Appendix B: Related Aberdeen Research & Tools 19

All print and electronic rights are the property of Aberdeen Group © 2006.

Figures

Figure 1: Inbound Design Data Delivered in Many Formats 1

Figure 2: Top Performers Hit Targets on a 93% Average or Better 5

Figure 3: Top Performers Reuse Designs at Twice the Rate of Laggards 6

Figure 4: Manufacturers Pursuing an Insulated Product Development Process .. 7

Figure 5: Manufacturers Outsourcing Design Translation and Re-creation 9

Figure 6: Translation Technology Used for Multi-CAD Conversion 10

Figure 7: Visualization Technology Used for Multi-CAD Assembly 11

Figure 8: Data Management Approach to Multi-CAD 12

Figure 9: Tracking Approach for Design Representations in Multiple Formats ... 13

Tables

Table 1: Manufacturers' Top Strategies to Address Multi-CAD Dilemma 2

Table 2: Manufacturers' Top Challenges and Responses for Multi-CAD Design .. 3

Table 3: PACE Framework 17

Table 4: Relationship between PACE and Competitive Framework 18

Table 5: Competitive Framework 18

All print and electronic rights are the property of Aberdeen Group © 2006.

Chapter One:
Issue at Hand

Key Takeaways

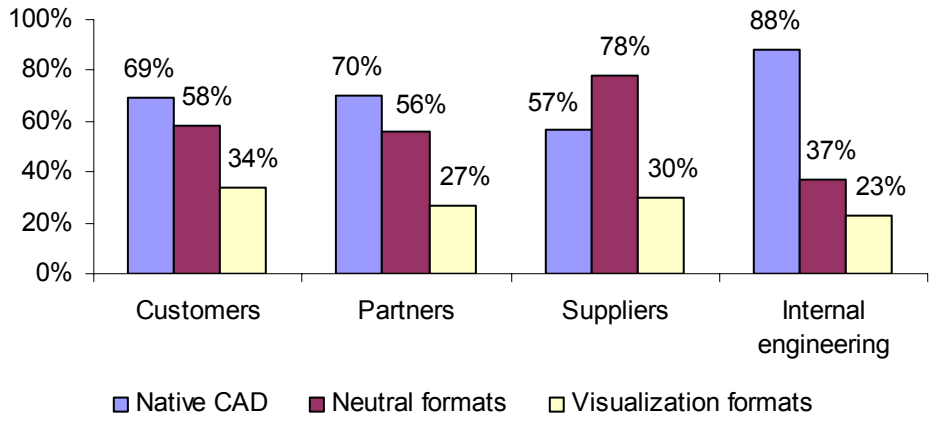
- Customers, partners, and other engineering organizations primarily deliver natively formatted CAD data. Suppliers primarily deliver design data in neutral formats.
- Many engineering organizations are adopting an insulated product development approach to avoid the disruptive effects of multi-CAD data exchange.
- Significant staffing, design re-creation, and product development infrastructure challenges surface as a result of following the insulated product development approach.

The idea was a good one. As the necessity to work with other engineering and manufacturing organizations outside the four walls increased, so too did the need to share design data. Sharing design data eliminated ambiguity because of its precise nature. It enabled collaboration over long distances because of its electronic nature. But increasingly the effort to convert, translate, re-create and duplicate design data into multiple formats is almost more trouble than its worth.

Inbound Multi-CAD Design Data: Making Lemonade out of Lemons?

When it comes to working with other organizations, the format of design data that is exchanged tends to depend on its origin (Figure 1).

Figure 1: Inbound Design Data Delivered in Many Formats



Source: Aberdeen Group, December 2006

- Design data from customers and partners primarily is delivered in native CAD formats (69% and 70%) and, secondarily, in neutral formats (58% and 56%).

All print and electronic rights are the property of Aberdeen Group © 2006.

- Design data from suppliers is most likely to be received in neutral formats (78%), followed by native CAD formats (57%).
- Design data from other internal engineering groups is largely delivered in native CAD formats as opposed to neutral formats (88% versus 37%).

Because engineering organizations often receive data from each of these sources, they are likely to be receiving data in all of these formats. As a result, they are confronted with two realities:

Automotive Supplier

"Providing design services, my customer sets the standard. They tell suppliers what to do. Even though we are simply using different versions of the same CAD tool, we run into many of the same multi-CAD issues."

- As they receive design data in this variety of formats, how do they bring them all together? Assembling native-, neutral-, and visualization-formatted design data is no easy task.
- Native data exchange is a good thing if the receiving company's CAD system matches the originator's system. If it does not, how does the receiving company convert it into a format it can use? Furthermore, even if the CAD format is the same, it may be the wrong version. Many companies go back to the originator of the data to ask for neutral data instead.

Overall, the fact is that manufacturers are receiving design data in a dizzying array of native, neutral, and visualization formats. How can engineering organizations be successful with this input to the design process?

Industrial Equipment Manufacturer

"We receive design data from our customer primarily in neutral formats such as IGES and STEP. We read them in fairly successfully and don't need to make changes."

Adopting an Insulated Product Development Approach

From the outside, the solution may seem simple: acquire CAD tools to match incoming design data formats. But, surprisingly, engineering organizations seem to be adopting the exact opposite strategy (Table 1).

Table 1: Manufacturers' Top Strategies to Address Multi-CAD Dilemma

Strategic Actions	
Design in one CAD format and delivery in many	70%
Deliver designs in neutral CAD format	52%
Increase internal competencies	52%
Standardize CAD to pursue software volume purchase discount	50%
Partner to translate design into specific CAD format	21%

Source: AberdeenGroup, December 2006

In fact, three of the top five strategic actions pursued by engineering organizations show they are insulating themselves from the multi-CAD effect by standardizing on a single

All print and electronic rights are the property of Aberdeen Group © 2006.

CAD application. The idea is that they can receive and deliver design data in multiple formats while keeping things simple internally.

- First, they *design in one CAD format and delivery in many* (70%). With this approach, engineering is receiving design data in many formats, converting it, completing design work, converting back to the inbound native CAD format, and delivering it back.
- Second, some organizations are working to *deliver designs in neutral CAD formats* (52%) instead of in native formats. Rather than converting data into a variety of formats, they receive and deliver only neutral formatted design data.
- Last, some organizations *partner to translate design into CAD-specific formats* (21%). This strategy, which is complementary to the first one, places the burden of converting design data on a partnering organization outside engineering.

DMP CryoSystems

"Developing products nowadays is a combined effort between suppliers, our department, and manufacturing. It's not as simple as everyone uses this CAD system for development because no one's complete set of customers uses a single CAD tool."

Bob Wells

All in all, the conclusion here is clear. Today's business environment is forcing engineering to receive and deliver design data in a variety of CAD formats. In response, those organizations are trying to insulate themselves from the effects of this disruption as much as possible.

Challenges Plague the Insulated Product Development Approach

While following an insulated product development strategy is common, many encounter formidable challenges as a result (Table 2).

Table 2: Manufacturers' Top Challenges and Responses for Multi-CAD Design

Challenges		Responses	
Different CAD release versions create incompatibilities	46%	Train users on specific CAD tool	43%
Re-create designs in new CAD format because of translations geometry errors	44%	Deploy CAD tools that support multiple or neutral 3D formats	41%
Specialized CAD users can't be switched to projects using other CAD tools	41%	Releasing designs in neutral or standardized format	34%
Re-create designs in multiple CAD formats	38%	Rebuild CAD models from scratch in primary CAD system	33%
Generalized CAD users aren't as efficient with any one CAD tool	28%	Implement PDM that supports multiple CAD tools	19%

Source: AberdeenGroup, December 2006

All print and electronic rights are the property of Aberdeen Group © 2006.

Insulated Product Development Requires CAD Specialization

A challenge associated with the multi-CAD environment is staffing. Should the company hire users that are CAD specialists or generalists?

- The problem with the first is that engineering managers find *specialist CAD users can't be switched to projects using other tools* (41%).
- The problem with the second is that engineering managers find *generalist CAD users aren't as efficient with any one CAD tool* (28%).

What are engineering organizations doing in response? Insulated product development organizations *train users on specific CAD tool* (43%) so they can *design in one CAD format and delivery in many* (70% in Table 1).

Adopting Multiple or Neutral 3D Technologies for Design Re-creation

Another challenge of the multi-CAD design environment is converting design data between formats. Two of these challenges deal directly with re-creating design data:

- Engineers *re-create designs in new CAD formats because of translation geometry errors* (44%). Once they run into translation geometry errors, rather than fix the problems, engineers will commonly create new designs instead because it is the easier and faster option.
- Engineers also *re-create designs in multiple CAD formats* (38%) when customers require that feature histories be included in the design data or when internally driven design changes are required.

As a result, engineering is taking steps to *deploy CAD tools that support multiple or neutral 3D formats* (41%). This allows engineers and designers to avoid the time-consuming task of re-creating designs in different formats.

Multi-CAD Reality Complicates the Product Development Infrastructure

The network of interrelated software products supporting product development can be terribly complex. Vendors release different versions of their software that are never coordinated. As a result, *different CAD release versions create incompatibilities* (46%).

When extended into the supply chain, the picture gets uglier. This is especially true as suppliers try to match the configurations of multiple customers. Engineering organizations are trying to circumvent the problem by *releasing designs in neutral or standardized format* (34%). This tactic introduces flexibility into the equation as most CAD applications, regardless of version, support neutral or standardized formats.

All print and electronic rights are the property of Aberdeen Group © 2006.

Chapter Two:
Key Business Value Findings

Key Takeaways

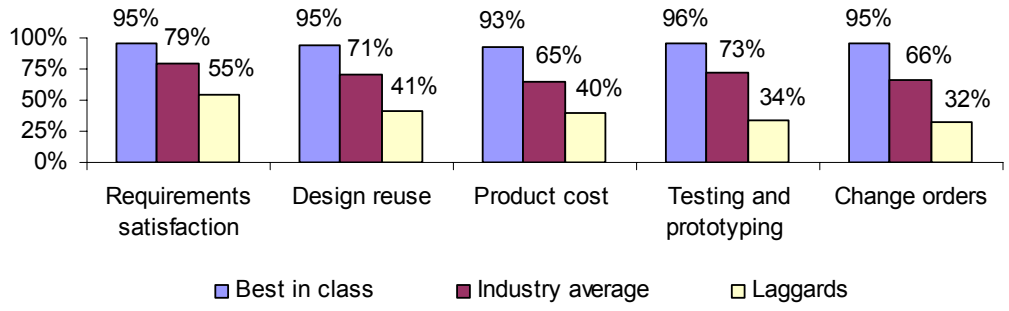
- Top performers hit engineering product development targets on a 93% or better average compared to 55% or worse for laggards.
- Top performers reuse designs at twice the rate of laggards by making design data easier to find with data management and easier to use by being in the correct format.

While many engineering organizations are following strategies to address the problems of inbound design data in multiple native CAD formats today, Aberdeen research shows that they face serious challenges. While some are taking steps in response, their strategies and tactics are only as good as the results they deliver.

Top Performers Hit Development Targets on 93% or Better Average

To get a clear picture of which strategies and tactics are successful, Aberdeen categorized survey respondents by measuring five key performance indicators (KPIs) that provide *financial, process,* and *quality measures* (Figure 2). This classification subsequently enabled differentiation between the "best practices" of the top performers and the practices of lower performing engineering organizations.

Figure 2: Top Performers Hit Targets on a 93% Average or Better



Source: AberdeenGroup, December 2006

Based on aggregate scores incorporating all five metrics, those companies in the top 20% achieved "best in class" status; those in the middle 50% were "average"; and those in the bottom 30% were "laggard." As expected, companies in the different performance categories show substantial differences – with best in class hitting all five marks at a 93% or better average.

All print and electronic rights are the property of Aberdeen Group © 2006.

Top Performers Reuse Designs at Twice the Rate of Laggards

Increase design reuse. While it is a goal worthy pursuing, developing products in a multi-CAD environment erodes efforts to achieve the goal.

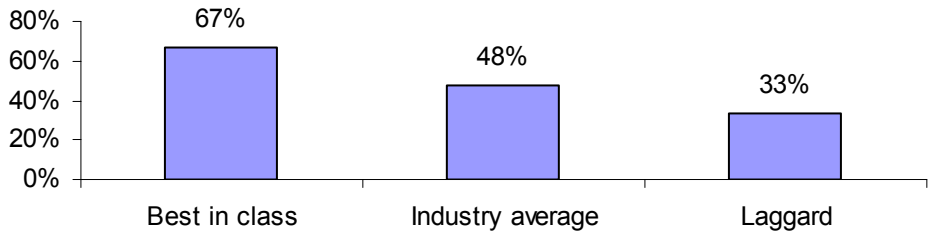
- ***Searching through multiple data management tools*** – In a multi-CAD environment, some manufacturers utilize different data management tools to manage the design data for each different CAD application. Unfortunately, engineers are much less likely to search through two or three data management tools than one.
- ***Design data exists in the wrong format*** – Once engineers find a design, it can often be in a format not native to the applications that they now use. Instead of translating or duplicating the design in the new CAD format, they would rather create a new part or subassembly.

When design reuse lags as a result, a number of problems occur:

- ***Engineers waste time creating new designs*** – When engineers don't use an existing part that could fit the need, they have to take the time to create a new part for their purposes. The time delays associated with creating new designs as opposed to simply reusing designs affect the probability of hitting launch dates.
- **Duplicate inventory leads to higher lifecycle costs** – Creating a new design affects the overall lifecycle costs of the product. A new part number is introduced instead of reusing one. This leads to maintaining safety stock levels for multiple items that are effective equivalents, each with its own inventory holding costs.

In the end, time is introduced into the development cycle, and cost is added into the maintenance lifecycle. Interestingly enough, the best in class performers avoid both of these problems (Figure 3).

Figure 3: Top Performers Reuse Designs at Twice the Rate of Laggards



Source: AberdeenGroup, December 2006

Because the best in class performers have such a high rate of design reuse, they are hitting their targets for product cost, testing, and prototyping as well as launch dates.

All print and electronic rights are the property of Aberdeen Group © 2006.

Chapter Three:
Implications & Analysis

Key Takeaways

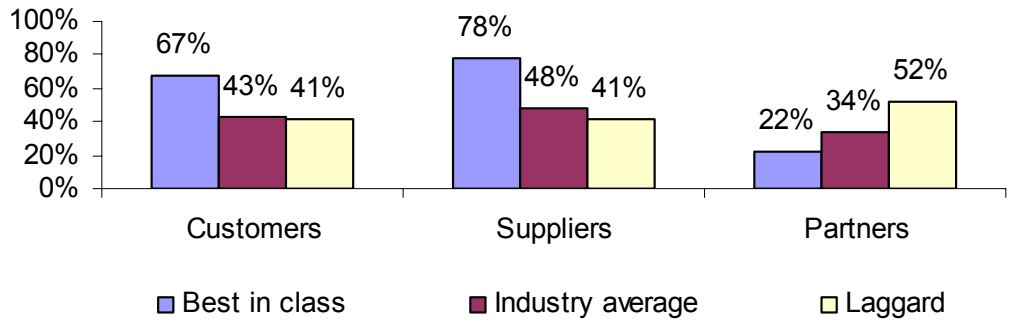
- Top performers employ an insulated product development process, in which they do not match CAD tools but deliver native design data to customers and suppliers.
- Top OEMs are 70% more likely to outsource the translation and re-creation of design data. Top contract manufacturers are 50% less likely to do so.
- Top performers are ten times more likely to use third-party translation applications.
- Top performers are 2.5 times more likely to use engineering visualization to assemble mixed CAD design data.
- Top performers are 23% more likely to use a single data management tool and 50% more likely to use it to track the associations among designs in multiple formats.

As noted earlier, the aggregated performance of surveyed companies determined whether they ranked as best in class, industry average, or laggard. In addition to having common performance levels, each class also shares characteristics and practices in four key categories – processes, organizational structure, technology usage, and performance measurement.

Integrated and Insulated Product Development Processes

Aberdeen research shows that the top strategy being pursued in response to multi-CAD business drivers is to *design in one CAD format and delivery in many* (70%). But an insulated product development approach isn't applicable in all situations (Figure 4).

Figure 4: Manufacturers Pursuing an Insulated Product Development Process



Source: Aberdeen Group, December 2006

The idea of using CAD tools that do not match the formats of inbound design data, yet still delivering design data back in the original native format is a practice that should be selectively employed.

All print and electronic rights are the property of Aberdeen Group © 2006.

Insulating Product Development from Customers and Suppliers

When it comes to delivering designs to customers and suppliers, employing an insulated product development process makes sense. In fact, the best in class are 63% more likely to use this approach with customers and 90% more like to use it with suppliers. There are two significant reasons why:

- As shown in Aberdeen's *The Global Product Design Benchmark Report*, desire to keep knowledge in-house (48%) is the top inhibitor to extending the design chain outside a manufacturer's four walls. The best in class are protecting their intellectual property by converting their design data into different formats.
- The second reason to employ the insulated product development process is to preserve internal efficiencies within the engineering organization. Maintaining multiple engineering groups, each of which specializes in a specific CAD tool, reduces the agility of the organization. Specialist engineers cannot be switched between projects that utilize different CAD tools. Likewise, maintaining generalist CAD users decreases the expertise and, thus, the efficiency of the design process.

Ovalstrapping

"Excluding the software we keep around to maintain legacy design data, we use a single design tool. We do this despite the fact that we receive and deliver design data in multiple formats so we can avoid the extra training costs, learning costs, and maintenance costs associated with multiple CAD systems"

Phil Jones

Overall, it comes down to a matter of trust and operational efficiency. The top performers receive and deliver design data in many formats, but internally use their own standard for design.

Ball Aerospace and Technology

"A number of years ago, we were using three different CAD systems internally. It took approximately two full weeks to get up to speed on one of them. We have since switched to one internal tool that takes less than a week because it's dramatically easier to use. Our goal is not to worry about them. "

Chris Ludke

Integrating Product Development with Partners

Working with partners is a different matter. In this scenario, best in class manufacturers are 58% less like to use an insulated product development process.

- With regard to intellectual property, working with a partner can be dramatically different from working with customers and suppliers. Many manufacturers enter into a partnership knowing what intellectual property is going to be shared. In addition, they often carve out a group separate from internal engineering that focuses on the partnership.
- Looking at partnerships from the perspective of internal engineering efficiency, the definition of the boundaries of "engineering" is different. Here, "engineering" consists of the product development groups across both companies dedicated to partner development. In this case, use of multiple CAD applications decreases efficiencies.

All print and electronic rights are the property of Aberdeen Group © 2006.

All in all, when operating in a product development partnership, the top performers are aligning their design tools with their partners' to avoid a multi-CAD data environment.

DMP Cryosystems

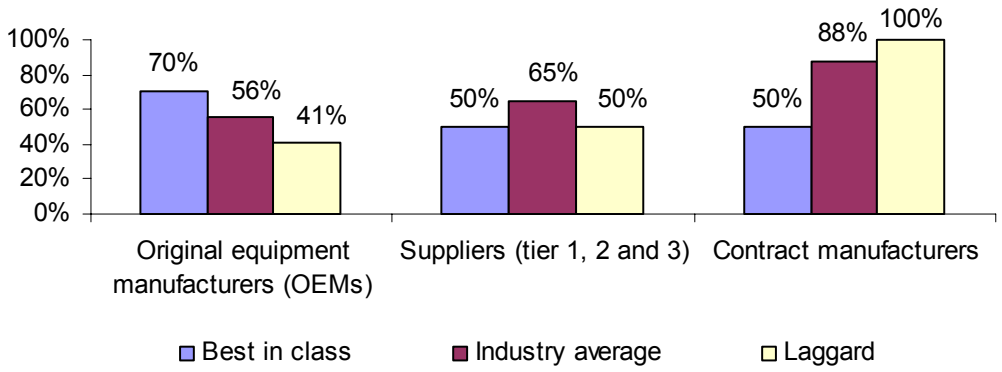
"Why do we utilize a single CAD system? It makes no sense to design a piece of equipment in three different formats for different suppliers. It's simply too expensive from a learning-curve perspective and to make sure the revisions of all the applications are kept up-to-date."

Bob Wells

An Organizational Enabler: Outsourcing Translation and Re-creation

Given that some manufacturers employ an insulated product development process, how are these organizations converting design data between formats? In today's business climate of outsourcing, a natural alternative is to work with someone outside of the four walls to translate or even re-create design data. In fact, many manufacturers are taking advantage of these resources (Figure 5).

Figure 5: Manufacturers Outsourcing Design Translation and Re-creation



Source: Aberdeen Group, December 2006

Interestingly enough, outsourcing the conversion of design data is a good practice depending on the manufacturer's role in the supply chain. Overall the top-performing OEMs are 41% more likely to outsource design data translation or re-creation. However, top-performing contract manufacturers do exactly the opposite. They are 50% less likely to outsource this work.

Technologies That Tame the Multi-CAD Reality

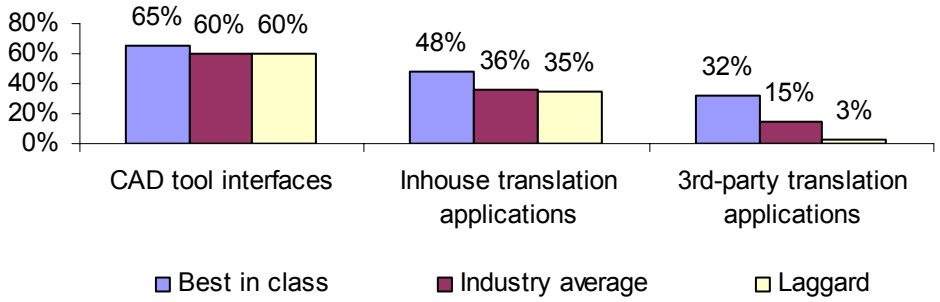
In addition to process and organizational changes, some manufacturers leverage translation, visualization, and data management technologies to address multi-CAD issues.

All print and electronic rights are the property of Aberdeen Group © 2006.

Leveraging Third-Party Core Competencies for Design Translation

What do companies that do not outsource design data translation or re-creation do? The top performers are turning to translation technologies to convert design data between formats (Figure 6).

Figure 6: Translation Technology Used for Multi-CAD Conversion



Source: Aberdeen Group, December 2006

- ***CAD tool interfaces*** – The most basic translation option and most used capabilities for translating data into varying formats are the interfaces within the CAD application. While popular, there are not significant differences in the use of these types of embedded technologies by best in class and laggard performers.
- ***In-house translation applications*** – Some manufacturers that were encountering the multi-CAD movement early developed their own translators that met their own, sometimes specific, needs. While the best in class are 37% more likely to leverage this technology to their advantage, maintaining these applications is anything but a core competency for most manufacturers. As a result, they may not be kept interoperable with the ongoing releases of new CAD software versions.
- ***Third-party translation applications*** – Of the three types of applications, these are specifically architected to translate design data from one format to another. Because the developers of these technologies focus their core competencies on translation, these applications are kept in synchronization with new software releases. Overall, top performers are ten times more likely to leverage this type of technology.

Aerospace Manufacturer

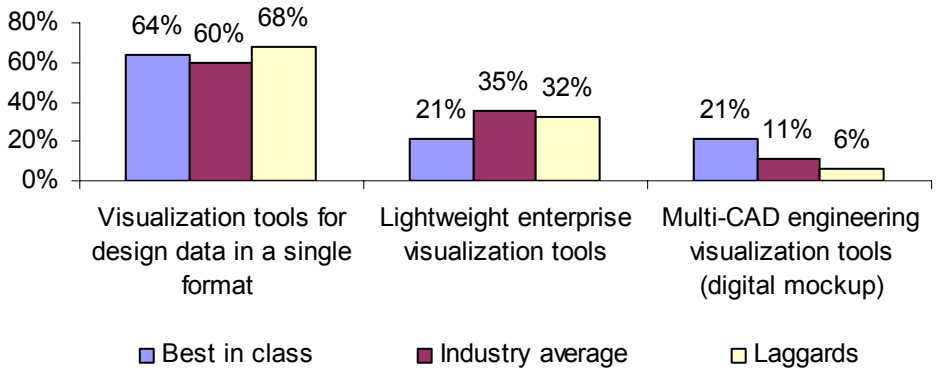
"We utilize third-party translation applications to arrive at better geometry after the translation compared to neutral data translations. But in addition to better geometry, we also use these tools to make sure we don't exceed the 32-bit hardware memory limit. These applications manage the memory to avoid that problem."

An Engineering Job Demands Engineering Visualization

With the advent of visualization technologies that can read design data, it was only a matter of time before manufacturers applied this technology to the multi-CAD issue. As a result, many manufacturers are exploring this technology as a solution (Figure 7).

All print and electronic rights are the property of Aberdeen Group © 2006.

Figure 7: Visualization Technology Used for Multi-CAD Assembly



Source: Aberdeen Group, December 2006

However, not all visualization technologies are capable of offering all the capabilities engineers require to tackle this problem. In fact, another trend in visualization is causing a bifurcation in the direction of these applications.

- ***Visualization tools for design data in a single format*** – While visualization tools that read design data in a single format are useful and popular in single CAD environments, they do not allow engineers to bring together design data from multiple formats. Not surprisingly, the best in class are not more likely to use this type of technology.
- ***Lightweight enterprise visualization tools*** – With the expansion of product lifecycle management (PLM) products to include enterprise users outside of engineering, the emergence of enterprise visualization of engineering design data began. While very useful for the enterprise, this type of application holds little value for engineering in solving multi-CAD issues. These applications or applets lack the capabilities engineers need to tackle fundamental use cases, much less to accomplish the rigorous tasks associated with multi-CAD design activities. As a result, best in class performers are 52% less likely to use them to tackle multi-CAD design issues.

Phillips

"As a company that has recently gone through several acquisitions, we have various divisions using different CAD application that they have acquired over time. We use visualization technology to publish geometry into visualization formats that anyone can view without the CAD system."

Greg Richards

- Multi-CAD engineering visualization tools (digital mockup) – In returning visualization to its roots, some software providers have developed a new class of applications that offer more advanced engineering and design capabilities in addition to visualization's ability to read design data from multiple native formats. The best in class are clearly taking advantage of this technology. Overall they are 2.5 times as likely as laggards to use it.

All print and electronic rights are the property of Aberdeen Group © 2006.

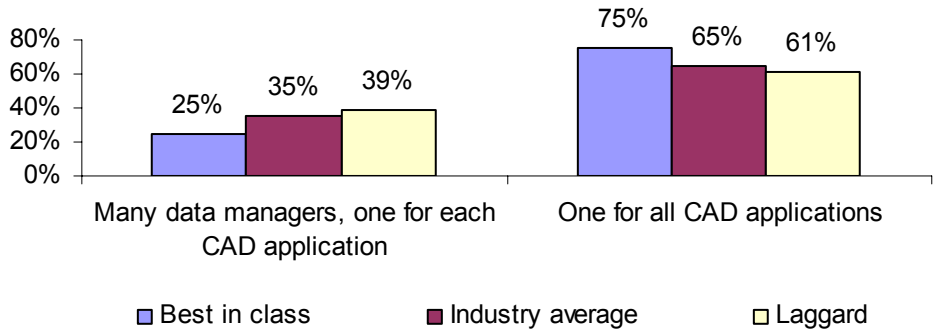
Regarding Multi-CAD Data Management: Less Is More

When faced with the reality of receiving design data in a variety of formats, engineering organizations must answer a formidable question: how should all this design data be managed?

- On one hand, they could deploy CAD-specific data management tools, each of which manages the design data for one CAD application.
- On the other hand, they could deploy a single data management tool to manage all design data from all CAD applications.

Aberdeen research finds that the top performers have consolidation in mind (Figure 8).

Figure 8: Data Management Approach to Multi-CAD



Source: Aberdeen Group, December 2006

Overall, the best in class are 23% more likely to implement a single data management tool to manage all design data. This choice allows them to reduce the IT resources required to manage their data management applications and keep their product development IT configuration less complex.

Scriven Precision Fabrication

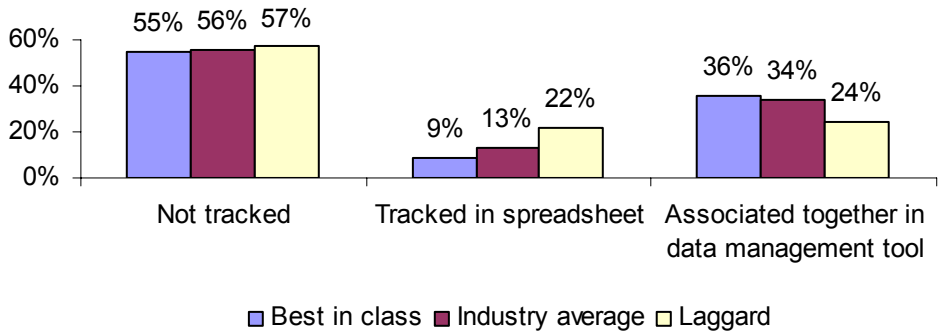
"When we receive design data from our customer, we commonly convert it into a format we can read into our own CAD system where we create minimal drawings. We also bring it into our CAM system where we create NC toolpaths for manufacturing. We then consolidate all of this data together under a single part number."

Larry Hager

However, the impact for engineering is more direct. Specifically, a critical enabler for promoting design reuse is the ability to quickly and easily find designs. If designs are spread across multiple data management systems, the ability to find them decreases dramatically. However, keeping all this data in a single data management tool is not enough. If designs that exist in multiple CAD formats are not connected in some way, users won't know about all of them. This increases the chance they may re-create something that already exists in the desired format and decreases the chance of design reuse overall. Although there are a couple of options for tracking these associations, the best in class prefer data management tools (Figure 9).

All print and electronic rights are the property of Aberdeen Group © 2006.

Figure 9: Tracking Approach for Design Representations in Multiple Formats



Source: Aberdeen Group, December 2006

Most organizations do not track these associations in any form. While laggards are most likely to track these associations in spreadsheets, keeping them up-to-date through the work-in-process phase of the product development process is challenging. The ideal solution is to leverage applications already in use to manage this data, and that's what the best in class do. In fact, they are 50% more like to use data management tools to manage and track these cross-format associations than laggards.

All print and electronic rights are the property of Aberdeen Group © 2006.

Chapter Four: Recommendations for Action

Key Takeaways

- Employ an insulated product development process with customers and suppliers.
- OEMs should outsource the translation or re-creation of design data.
- Deploy third-party translation applications to convert design data to different formats.
- Utilize engineering visualization tools to assembly multi-formatted design data.
- Implement a single data management system to manage design data of all formats.
- Use data management to associate designs in different formats to one another.

Product development is only getting more complicated, in some part due to data exchange with customers, suppliers, partners, and other internal engineering organizations. However, some manufacturers are overcoming this challenging environment to hit their product development targets at a high frequency. Regardless of whether your company falls into the "best in class", "industry average," or "laggard" categories, the following actions, derived from their successful practices, will help you improve your performance.

Laggard Steps to Success

1. *Utilize engineering visualization tools to assembly multi-format design data.*

   Instead of translating or re-creating all inbound design data into the CAD format that matches your internal tools, use engineering visualization tools to assemble the design data that exists in different CAD formats in order to perform all the necessary engineering activities. This practice will reduce engineering time and costs.

2. *Use spreadsheets to track all the CAD data that represents a single design.*

   As an intermediate step as you migrate to using a single data management tool to associate designs in different formats to one another, use spreadsheets to track the associations manually. In addition, distribute the information in order to increase design reuse.

3. *Deploy third-party translation applications for design data translation.*

   Supplement the use of CAD translation tools with the use of third-party translation tools to convert design data from one format to another. Move to replace in-house translation tools with off-the-shelf applications.

All print and electronic rights are the property of Aberdeen Group © 2006.

Industry Norm Steps to Success

1. *Implement a single data management system to manage design data in all formats.*

   Instead of managing design data in multiple data management tools, each of which is specific to one CAD application, centralize applications in order to reduce IT support costs and consolidate design data in a single repository.

2. *OEMs should outsource the translation or re-creation of design data.*

   OEMs, as opposed to suppliers and contract manufacturers, should use outsourced experts to translate and re-create design data between formats. This allows those manufacturers to focus on internal engineering efficiencies.

3. *Employ an insulated product development process with customers and suppliers.*

   Implement an insulated product development process to protect intellectual property and to preserve internal engineering efficiencies. Select your CAD application based on your needs and leverage outsourcing or technology to deliver design data to customers and suppliers in native formats.

Best in Class Next Steps

1. *Use data management to associate designs in different formats to one another.*

   Use the central data management tool to associate designs existing in different CAD formats that represent the same part or assembly. This will increase design reuse as users realize that the designs already exist in the format required, reducing effort spent in re-creating or translating the design or, even worse; creating a new design.

Send to a Friend

All print and electronic rights are the property of Aberdeen Group © 2006.

Appendix A:
Research Methodology

During November 2006, Aberdeen Group, Cadalyst and Desktop Engineering examined experiences and intentions of more than 173 enterprises regarding multi-CAD design. Responding engineers completed an online survey that included questions designed to determine the following:

- The degree to which the reality of a multi-CAD design environment impacts corporate strategies, operations, and financial results
- The structure and effectiveness of existing engineering procedures
- Current and planned use of automation to aid these activities
- The benefits, if any, that have been derived from multi-CAD initiatives

Aberdeen supplemented this online survey effort with telephone interviews with select survey respondents, gathering additional information on service parts management strategies, experiences, and results.

The study aimed to identify emerging best practices for multi-CAD design and provide a framework by which readers could assess their own design capabilities.

Responding enterprises included the following:

- ***Job title/function:*** The research sample included respondents with the following job titles: staff (39%), manager (28%), director (6%), CFO or other C-level officer (4%), internal consultants (5%), and vice-presidents (4%).
- ***Industry:*** The research sample included respondents predominantly from manufacturing industries. Industrial equipment manufacturers represented 28% of the sample, followed closely by aerospace/defense and automotive, which each accounted for 14% of respondents. Manufacturers of metals and metal products totaled 10% of respondents. Other sectors responding included medical devices, telecommunications, and consumer goods.
- ***Geography:*** Nearly all study respondents were from North America, including 93% from the U.S. alone. Remaining respondents were from the Europe and the Asia-Pacific region.
- ***Company size:*** About 18% of respondents were from large enterprises (annual revenues above US$1 billion), 27% were from midsize enterprises (annual revenues between $50 million and $1 billion), and 54% of respondents were from small businesses (annual revenues of $50 million or less).

Solution providers recognized as sponsors of this report were solicited after the fact and had no substantive influence on the direction of the *Multi-CAD Design Chain Benchmark Report.* Their sponsorship has made it possible for Aberdeen Group, Cadalyst, and *Desktop Engineering* to make these findings available to readers at no charge.

All print and electronic rights are the property of Aberdeen Group © 2006.

Table 3: PACE Framework

PACE Key
Aberdeen applies a methodology to benchmark research that evaluates the business pressures, actions, capabilities, and enablers (PACE) that indicate corporate behavior in specific business processes. These terms are defined as follows: *Pressures* — external forces that impact an organization's market position, competitiveness, or business operations (e.g., economic, political and regulatory, technology, changing customer preferences, competitive) *Actions* — the strategic approaches that an organization takes in response to industry pressures (e.g., align the corporate business model to leverage industry opportunities, such as product/service strategy, target markets, financial strategy, go-to-market, and sales strategy) *Capabilities* — the business process competencies required to execute corporate strategy (e.g., skilled people, brand, market positioning, viable products/services, ecosystem partners, financing) *Enablers* — the key functionality of technology solutions required to support the organization's enabling business practices (e.g., development platform, applications, network connectivity, user interface, training and support, partner interfaces, data cleansing, and management)

Source: Aberdeen Group, December 2006

All print and electronic rights are the property of Aberdeen Group © 2006.

Table 4: Relationship between PACE and Competitive Framework

PACE and Competitive Framework How They Interact
Aberdeen research indicates that companies that identify the most impactful pressures and take the most transformational and effective actions are most likely to achieve superior performance. The level of competitive performance that a company achieves is strongly determined by the PACE choices that they make and how well they execute.

Source: Aberdeen Group, December 2006

Table 5: Competitive Framework

Competitive Framework Key
The Aberdeen Competitive Framework defines enterprises as falling into one of the three following levels of FIELD SERVICES practices and performance: *Laggards (30%)* — practices that are significantly behind the average of the industry, and result in below average performance *Industry norm (50%)* — practices that represent the average or norm, and result in average industry performance. *Best in class (20%)* —practices that are the best currently being employed and significantly superior to the industry norm, and result in the top industry performance.

Source: Aberdeen Group, December 2006

All print and electronic rights are the property of Aberdeen Group © 2006.

Appendix B:
Related Aberdeen Research & Tools

Related Aberdeen research that forms a companion or reference to this report includes:

- *The Transition from 2D Drafting to 3D Modeling Benchmark Report: Improving Engineering Efficiency* (September 2006)
- *The Protecting Product Intellectual Property Benchmark Report: Safeguarding Design Intellectual Property in a Global Market* (November 2006)
- *The Product Lifecycle Collaboration Benchmark Report: The Product Profitability "X Factor?"* (June 2006)
- *The Global Product Design Benchmark Report* (December 2005)
- *The Product Innovation Benchmark Report* (September 2005)

Information on these and any other Aberdeen publications can be found at www.Aberdeen.com.

Aberdeen Group, Inc.
260 Franklin Street
Boston, Massachusetts
02110-3112
USA

Telephone: 617 723 7890
Fax: 617 723 7897
www.aberdeen.com

© 2006 Aberdeen Group, Inc.
All rights reserved
Month 2006

Founded in 1988, Aberdeen Group is the technology-driven research destination of choice for the global business executive. Aberdeen Group has over 100,000 research members in over 36 countries around the world that both participate in and direct the most comprehensive technology-driven value chain research in the market. Through its continued fact-based research, benchmarking, and actionable analysis, Aberdeen Group offers global business and technology executives a unique mix of actionable research, KPIs, tools, and services.

The information contained in this publication has been obtained from sources Aberdeen believes to be reliable, but is not guaranteed by Aberdeen. Aberdeen publications reflect the analyst's judgment at the time and are subject to change without notice.

The trademarks and registered trademarks of the corporations mentioned in this publication are the property of their respective holders.