Advancing Mainstream Workgroup Data Management
Lessons from Three Leaders

February 11, 2010

By Bruce Jenkins, Principal Analyst, Ora Research LLC

Are you ready for mainstream workgroup data management? Are shortcomings in how your engineers work in teams, share and reuse data, manage revisions, and release designs holding back your business?

Ora Research studied three small to medium-size manufacturers that successfully implemented workgroup data management using Autodesk Vault Workgroup. We investigated what drove them to recognize the need, how they selected and implemented a solution, and what payback they're seeing.

We found five flags that signal an urgent business need for companies to improve how they accomplish team design, share and reuse engineering information, and manage design revisions and release. If any of these describe your business, mainstream workgroup data management may be for you.

1. **Data disorder, uncoordinated design teams** You can't afford any more schedule setbacks from designers overwriting each other's files or working on outdated versions. You need a way to get engineers working more effectively in teams – to speed up design, to take on more complex work, to make more efficient and flexible use of your engineering staff.

2. **Hard-to-find parts** You've got to stop redesigning and remanufacturing parts you know you've made before, but can't find when you need them. You know you could reuse the same part in many places – within a single product, as well as from one product to the next – if you had a better way to search existing designs.

3. **Design history confusion** You need a better audit trail of design history – for internal control and understanding of design iterations and progress tracking, or for compliance with customer or regulatory requirements.

4. **Release confusion** You need a way to ensure models and drawings are not prematurely released or accidentally accessed by purchasing, scheduling, manufacturing or others outside the engineering group.

5. **Fiscal reality** Your budget for getting data management under control is closer to $1000 than $100,000. You can't afford a year to implement and an army of programmers to configure and administer.

What should you expect from mainstream workgroup data management?

How can mainstream workgroup data management help you meet these challenges? As the experiences of the three leaders profiled in this report demonstrate, today the value of this capability is how it can help you:

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P.O. Box 391227
Cambridge, MA 02139 USA
tel. +1 617 875 9598
fax +1 617 812 2443
www.oraresearch.com

1. **Work in teams** Enable team-based design, without putting design data at risk and without requiring engineering groups to change established work processes. Give every stakeholder both in engineering and beyond a way to have secure, controlled access to live design data. Every company studied cited the value of Vault Workgroup in saving their engineers lost time working on the wrong version of a design, or having their work altered by others not authorized to do so. As Infinia CAD system administrator Jim O'Flaherty puts it, "With Vault Workgroup, data isn't being changed midstream by someone else, so you don't have to worry about someone else either overwriting or duplicating what you've done."

2. **Reuse engineering data and minimize rework** Search and retrieve past designs and components quickly and easily enough to cut out wasteful remodeling and remanufacturing. Infinia's O'Flaherty explains that each of the company's different engineering groups "has its own product lifecycles, and with Vault Workgroup we have been able to capture each of those lifecycles" – enabling part reuse, minimizing design rework and boosting engineering efficiency.

3. **Capture design history** Use revision control to have an audit trail of what went on in a design's history – not only for internal use but also for compliance with even the most stringent external requirements. "For us," says QED engineer David Russell, "the primary purpose of moving to Vault Workgroup was compliance with the FDA, and their rules and regulations with regard to design history."

4. **Secure, release and track data revisions** Use revision control to avoid the cost, time and rework penalties incurred when the wrong version of a design is accessed by purchasing, manufacturing or others. By letting A.T. Ferrell CAD Manager Allen Gager control who sees what, Vault Workgroup "lets me ensure that, for example, the scheduler has access only to the data in the Vault that's been marked for release – so I don't have to worry about scheduling or purchasing doing something with the data that they shouldn't."

5. **Quickly and easily configure, administer and train** Get your engineering data and workflows under control without spending $100,000 and a year of your time. Companies we studied typically required no more than three days working with an Autodesk engineer to map their workflows, install and configure Vault Workgroup, and receive basic user training. "We simply could not afford to put in the large, top-heavy PDM/EDM systems," says QED's Russell. As A.T. Ferrell's Gager sums up, "I thought Vault Workgroup was a real bargain – I honestly can't imagine why anyone wouldn't use it."

Lessons from three leaders

Here are the stories of three companies we studied: Why workgroup data management? Why Autodesk Vault Workgroup? What did it take to implement? What's been the payback?

QED, INC.
Lexington, Kentucky
www.qedisit.com

Medical lighting design and assembly firm
25 employees. 4 engineering staff
2 Autodesk Inventor licenses. 3 Autodesk Vault Workgroup licenses: 2 used by engineering staff, 1 floating license shared among purchasing staff for ordering and receiving/inspection/QA
Products: Halogen and xenon light sources for medical applications; fiber optic and halogen headlights for surgeons and physicians
Typical unit price: Medical products – $800-$5000
Typical number of parts: Medical products – ranges from 2 to 50+. Company now managing 4500-5500 parts in database

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Key business challenges: Accelerate design process; comply with U.S. FDA and other governments' regulations regarding design history, manufacturing practices, tracking of product issues in the field, maintenance, and design modifications in response to field issues

Image courtesy QED, Inc.

Need As a small, family-owned business that offers specialty medical lighting products, QED, Inc. competes by providing highly personalized service to its customers. "Our engineers are able to work directly with customers to address their particular lighting requirements," says David Russell, an engineer with QED, "and we can even create one-off designs if needed." In addition, "small medical products companies like us are [increasingly] being absorbed by larger manufacturers," Russell explains. "So staying competitive means that we have to be quicker, by getting our product out the door, tested and certified faster."

Thus the company was eager to accelerate its product development efforts, but needed to do so in accordance with increasingly stringent compliance requirements set forth by the FDA and other regulatory agencies around the globe. As QED's Compliance Officer, Clarence Johns, explains, "The FDA has a lot of requirements that a company must adhere to when designing new products – and design history is a big part of this." As he puts it, "throughout the life of a product, for almost everything the engineers do – from deciding which components to put in, to how these components are tested internally or externally to meet design intent – there is a set of documentation required." And that's just the beginning. "When components are purchased, we also have to document how they comply with FDA requirements," adds Johns. "In particular, a company must document its quality/inspection procedures for receiving purchased components."

Selection So what to do? QED wanted to improve its means of managing product data in order to increase design reuse. It needed to effectively track and manage changes to the product design in order to provide an audit trail, if required. And it had to be able to execute and document compliance with FDA regulations for purchased components. Finally, the ability to support this effort easily and without a lot of additional expense was key.

QED selected Vault Workgroup to address these requirements after determining that Workgroup would allow all stakeholders – not just those in engineering – to have secure access to current-state, native Inventor files. The company had been using Inventor since its inception, and had also been using standard Vault for some time. But Vault served primarily as a storage facility for design files. Initially, these files were made available beyond engineering only as paper copies; ultimately QED began using the Vault capability to propagate designs as DWF files to other stakeholders. "Still," says Russell, "Vault was pretty much software for engineering."

When Vault Workgroup became available, the lighting manufacturer saw an opportunity to move to a digital means of sharing design data far beyond the engineering group. "We can now share the latest and greatest with purchasing, receiving, inspection – and share it confidently, because they have direct access to it through Vault Workgroup," says Russell. "That is a big step forward for us."

Implementation Upgrading from basic Vault to Vault Workgroup was fairly straightforward for the company, according to Russell. QED initially invested in three seats of Workgroup to be shared across its engineering, manufacturing, compliance, purchasing, receiving and inspection departments. "Autodesk approached us to be part of the Early Adopter program for Vault Workgroup," Russell reports. "We accepted, and found we were able to use the software successfully and give them feedback."

Initial implementation was rapid. "One of their customer engineers spent three days with us on site to set it up, do basic configuration, and give us basic training." After this, "We were in contact with Autodesk for

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several months, giving them feedback during the Early Adopter program. Then when the software was fully released, we purchased additional licenses from Avatech, our reseller."

At this stage, Russell is configuring the system to expand into managing non-design data and, together with his team, is working on developing training materials. But there hasn't been a great need for much training yet. Russell, together with compliance officer Johns, "spent a couple of hours training our two purchasing people, and we haven't had any questions yet, so the system seems to be doing what it needs to do for them for now. We will soon expand our training to show them how to put their own data in; but first, from a regulatory standpoint, we have to define what kinds of data they need to be putting in and controlling."

Overall, how easy was it to implement Vault Workgroup? "On a scale of 1 to 10, I'd give it a 6, with 10 being easiest," says Russell. "We're still on that journey. We have not gone as fast as some users may have, but we wanted to do this slowly and not overwhelm our folks." Because he feels the move to Vault Workgroup asks a few individuals to make some changes in their work style, he doesn't want the implementation to move too fast. "There is a danger of throwing new technology out there and saying, 'Learn this,' and then it does not get used properly or as effectively as possible," he says. By taking it slowly, the company is comfortable it can avoid these pitfalls.

Payback By adopting Vault Workgroup, QED was able not only to achieve its goal of managing its compliance requirements, but to do so affordably. "For us, the primary purpose of moving to Vault Workgroup was compliance with the FDA, and their rules and regulations with regard to design history," says Russell. But Vault Workgroup also met another important requirement for the lighting manufacturer – its budget needs. As Russell sees it, Vault Workgroup is especially valuable because it fills a previously unmet need for companies of QED's size. "We simply could not afford to put in the large, top-heavy PDM/EDM programs," he says.

But having some kind of data management facility is critical for QED's industry. As Johns points out, "A manufacturer needs to be able to respond, even if there is a problem with a design that has been on the market for 10 years." In the past, a manufacturer might not have any indication of a problem until it received a phone call that a problem occurred. But now there are regulations that require that manufacturers look constantly at what the field is telling them, and to use this information to show that a company has made the necessary design changes to alleviate any problems that may arise down the road. Couple that with the environmental regulations that have come into effect in the last few years, which often differ greatly by country, and that also tracks into engineering and purchasing. "So, let's say we have 10 sources, and maybe five of them can't be shipped to the European Union because of chemicals in the product," says Johns. "You now have to track and do due diligence to prevent that," he explains. "Then if you have an event in the field, you have 24 to 48 hours to have your records available for the FDA. You essentially have to find that needle in the haystack."

Vault Workgroup offers a big advantage in being an affordable solution for this critical need. "We can maintain a history of our design process, and we can begin to track electronically our products that are out in the field," says Russell, "which addresses one of the FDA's biggest concerns – the ability for a manufacturer to quickly respond in the event of a product failure or recall."

Looking ahead, compliance officer Johns sees Vault Workgroup as the vehicle that will let QED categorize and make sense of all that hay, so it will know where the needle is every time. "Our ultimate goal is to put all this information into Vault Workgroup, which then makes the data very searchable," he sums up. "This lets us, a small firm, have the kinds of capabilities that our large competitors get from large-scale data management tools."

A.T. FERRELL COMPANY, INC.
Bluffton, Indiana
www.atferrell.com

Feed-grain processing and food processing machinery design and manufacturing firm
60 employees. 4 full-time engineering staff
4 Autodesk Inventor licenses. 5 Autodesk Vault Workgroup licenses: 4 used by engineering staff; 1 floating license shared among non-engineering stakeholders
Products: Air screen seed and grain cleaners, screeners, aspirators, vibratory scalping/sifting conveyors, debearders, hullers, cyclone separators, and custom-fabricated seed cleaning components; roller mills, cracking mills and flaking mills used by feed mills, cereal mills and food processors; cookers, steamers and coolers; on-farm feed mixing, grinding and conveyance systems
*Typical unit price: Confidential*
Typical number of parts: Several hundred to just under 2000
Key business challenges: Work closely with customers to innovate; introduce new technologies into products; increase product capacity and performance, while maintaining quality, without increasing cost

Image courtesy A.T. Ferrell Company, Inc.

Need A.T. Ferrell Company, Inc. has been in the business of designing and manufacturing feed-grain processing and food processing machines for over 140 years. One of its key competitive advantages? The company can provide a level of attention to custom detail that typical high-volume/low-cost equipment makers can't. "Almost always a customer wants something a little bit different than our standard product," says design engineer and CAD manager Allen Gager. "In fact, just about everything we do is one-of-a-kind." For example, "We had one customer who wanted significantly more pressure on the cereal rolls than what we typically built – two to three times more than what our bearing housings were designed to take. So we redesigned that housing for them using Autodesk Inventor Professional." He explains, "We needed the FEA capabilities of Inventor to be certain the bearing housings would meet those design requirements."
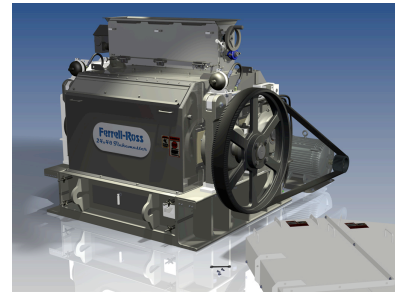
By working closely with customers, A.T. Ferrell is constantly figuring out how to do things it couldn't do before, and how to bring new technology into the game. "We are using Autodesk digital prototyping tools to design higher-capacity machines," Gager explains, "while maintaining the quality and long-term reliability our customers expect from machinery with our name on it."

Selection With quality, reliability and product performance all at the top of its list, A.T. Ferrell began seeking ways to further improve its design capabilities. As a longtime user of Autodesk Inventor, the company had successfully taken advantage of digital prototyping to improve engineering productivity in both reworking old designs and creating new ones. Now it was ready to leverage its design data more effectively outside of engineering.

"There were many aspects of Vault Workgroup that interested us," says Gager, "but the main reason we were drawn to it was that it was the first product to allow stakeholders outside of engineering to access the design data. That was a huge benefit." For that capability alone, the new technology was worth considering, according to Gager. He was especially impressed by Vault Workgroup's release file management feature, which allowed him to manage who sees what. "This feature lets me ensure that, for example, the scheduler has access only to the data in the Vault that's been marked for release – so I don't have to worry about scheduling or purchasing doing something with the data that they shouldn't."

"Another benefit," he continues, "is that it is from Autodesk. When the next release of Inventor comes out, so will the Vault family of products. I don't have to wait to upgrade. You don't get that with other vendors."

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Why Vault Workgroup over standard Vault? "Workgroup gives us a list of desirable features and allows true data access throughout the company. Workgroup's file-level revision control is exactly what we were looking for."

Implementation There were a couple of different facets to the installation, according to Gager. First, the implementation team spent a full day looking at all the different lifecycle scenarios possible, and mapping the company's engineering work process – a critical step in successfully implementing Vault Workgroup. In that activity, "we really got into the nitty-gritty of the company's workflows," says Gager, "and a lot of good came out of that."

The next step was to install the software and configure it to support those workflows. This phase went smoothly because of the time invested up front to explore the "what-if's" through the workflow mapping process. In fact, as Gager describes it, the actual install was "a piece of cake," and only took about a day and a half with the help of an Autodesk subject matter expert on site.

How difficult was it to learn how to use Vault Workgroup once the software was up and running? Not hard at all. The time invested in training was minimal – "maybe half a day," says Gager.

The next phase – uploading data to Vault Workgroup – presented some challenges. As it turned out, there was some information the company wanted to take advantage of in Vault Workgroup that was missing from its drawing file descriptions. The problem? The property data contained in the model and its associated drawings didn't match because the drawing file descriptions hadn't been kept up to date. To correct this, the company decided to sync the properties between its drawings and its models, before putting this data into Vault Workgroup. "Once we realized what the problem was," explains Gager, "we used Workgroup's Property Compliance feature to ensure this data was in sync before marking it for release in Vault Workgroup."

"Cleaning up old data is probably going to be anybody's biggest challenge," Gager explains. "We used this time to update our [legacy] data from poor drawing practices. We were working with data that was created back when people were just learning how to use Inventor. As the user skills evolved, so did the models' data structure. We build our models much more efficiently today than we did just starting out. This project gave us an opportunity to update these models. It may have added some time up front, but it ensures long-term happiness."

Those challenges aside, the process of actually checking in the models was relatively straightforward. "We had about 40,000 files," Gager reports. "Checking in all the files took about 10 weeks, because I went in and looked at every file to make sure that all the data we needed got in there. That also gave me an opportunity to get rid of some stuff – projects that should not have been in a released format, projects that were just dreams and should not have been called 'released,' etc."

Overall, how long did the implementation take? Initially, three to four days to map the company's workflows, configure the software to implement those workflows, and provide user training. Making all the necessary changes to the data and loading all the data into Vault Workgroup took between five and six months. "It's really a three-pronged approach – some automated install, some manual install, and some things you have to fix when you're loading the Vault with data," says Gager. "We broke these tasks into bites we could handle. It made the process much easier than other PDM systems I have experienced." He adds, "The level of support from Autodesk and my dealer (Industrial Technology located in Fort Wayne, Indiana) was excellent."

Payback A.T. Ferrell chose Vault Workgroup primarily because of the productivity gains from providing secure access to its design files throughout the organization beyond engineering. But Workgroup also offered other key benefits, according to Gager – the ability to identify files that might otherwise get lost, and the ability to manage revision states more effectively.

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"One of my favorite features of Workgroup," Gager adds, "is Workspace Synchronization. With Vault, you bring all the work from the server to the desktop that you're going to work on. But what if you've created a new project and you've never checked these files into the Vault? Workspace Sync not only identifies all the files that have been changed and should be put away; it will also find all the orphan files that Vault doesn't know what to do with, and that need to be reviewed."

As the software is further deployed through the organization, Gager foresees more people requesting access to a Vault Workgroup license – in sales, production, scheduling, purchasing – as they see how it affords easy access to the central data store. For example, as Gager explains, "Right now, I've got a scheduler who spends a great deal of time pulling files from a file drawer, making copies, and putting them out as scheduled orders." Going forward, this person will simply use Vault Workgroup's Plot Manager tool to produce hardcopy of all released drawings related to a project and send them off to the shop. Gager reports this will cut out hours off the time needed to make prints for a single job.

All in all, "I thought Vault Workgroup was a real bargain," says Gager. "I honestly can't imagine why anyone wouldn't use it, now that I've been on it."

INFINIA CORPORATION
Kennewick, Washington
www.infiniacorp.com

Stirling-engine-based solar power generation system design and assembly firm
150 employees total. 20 engineering staff
23 Autodesk Inventor licenses. 20 Autodesk Vault Workgroup licenses
Product: World's first solar power generation system suitable for automotive-scale manufacturing and deployment, ranging from small arrays to thousands of units deployed in utility-scale power plants
Typical unit price: Will be competitive with all other solar options in the marketplace
Typical number of parts: ±1100
Key business challenge: Develop family of free-piston Stirling engine (FPSE) designs that can be mass-produced and deployed at automotive scale

Image courtesy Infinia Corporation

Need Infinia Corporation is an alternative-energy innovator that specializes in developing solar-powered Stirling cycle engines. Their biggest challenge: delivering them on a commercial scale. As Infinia's CAD system administrator, Jim O'Flaherty, puts it, "Our challenge is reproducing these engines so that they work with very little tweaking. That's never been done before. Anyone can build a Stirling cycle engine by hand, but they've never been mass-produced."

Selection In order to move to a mass-production model, Infinia needed a product data management tool that would not only allow it to manage its engineering and design data effectively within its engineering department, but would also be scalable as the company expanded to meet anticipated market demand for its engines. Autodesk Vault Workgroup met this requirement, by allowing the company to manage its data on a department level first, then extend this capability throughout its organization, and even beyond its walls – once it was ready to do so.

More specifically, Vault Workgroup was selected not only because it allowed Infinia to effectively control access to its engineering data, but also because it would give the company greater flexibility in sharing data down the road. As O'Flaherty explains, "The engineering department is broken down into teams. Each group has to know what the others are doing, and have access to their parts, but not be able to change their parts. Vault Workgroup is key to that interface." Ultimately, the goal is to have departments

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such as purchasing be able to access part data as well – and to be able to send those part files out to vendors for quotes. "So upgrading to Vault Workgroup made sense for us," he says.

Implementation Because the company had already been using Vault for several years, the implementation of Vault Workgroup was pretty straightforward, according to O'Flaherty – "just time-consuming because we had so many workstations," he says. Installation and configuration involved three people – O'Flaherty and his assistant, plus an Autodesk subject matter expert who was on site at Infinia for just under a week. "A good portion of that time was spent sitting down with our Autodesk consultant, explaining what our lifecycles were and what we were doing manually," says O'Flaherty, "and then mapping our engineering workflow – identifying when parts go through sign-off and enter production, and so forth."

The Autodesk consultant also interviewed a number of employees to determine how the company could improve its processes and perform tasks more efficiently, and to understand what tasks users were spending time on that could be automated. Armed with this information, configuring Vault Workgroup to meet the company's needs was relatively simple. "Altogether, the team spent a day or so configuring the software, and another day customizing it," says O'Flaherty. "Then the implementation was effectively done overnight."

The rest of the time was spent on training, which essentially involved showing everyone a demo, providing a rundown of how Vault Workgroup worked, then fielding questions – all of which took only about an hour in total. And since everyone was already familiar with basic Vault, most of that time was spent explaining the new features in Workgroup, according to O'Flaherty.

All in all, the transition from basic Vault to Vault Workgroup was close to seamless, says O'Flaherty. "We did the implementation on a Tuesday night, and then people came in on Wednesday morning and just started plugging away," he says. "There were a few questions because of some new icons, but once that was taken care of, that was pretty much it."

Payback Although the company is still in startup mode on its commercial product, it has already begun to see real benefits from its use of Vault Workgroup. For one, communication has improved. "With Vault Workgroup, data isn't being changed midstream by someone else," says O'Flaherty, "so you don't have to worry about someone else either overwriting or duplicating what you've done." In essence, Vault Workgroup prevents changes from being made without approval, by providing control over parts based on their state, and the ability to "lock down" part definitions once they are finalized and ready for sign-off. "In the past, we'd see multiple change notices occurring at the same time for a part," says O'Flaherty. "That can't happen now, and that's a major plus."

Vault Workgroup has helped Infinia gain control of its engineering databases, which was its main objective. At the same time, it has enabled the company to categorize its parts. "Each group [within the company] has its own product lifecycles, and with Vault Workgroup we have been able to capture each of those lifecycles," says O'Flaherty. Ultimately, that means greater efficiency, more part reuse and, most critically, less design rework, says O'Flaherty – "and as fast-paced as we're moving here, that's key."