

**A Review of
Solid Edge V12 with Insight**

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**Prepared by
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Solid Edge's Insight offers easy to use data management

TechniCom provides an insight into Solid Edge Insight

Why the need?

Users need to manage and organize the highly interconnected data files that CAD systems generate. Parts need to be linked to multiple assemblies which often, in turn, need to be linked to higher levels of assemblies. Parts usually have drawings associated with them and there may be standalone drawings. Simple engineering tasks such as revising a part may cause changes to every assembly which it is part of. The software links that connect these items must be carefully managed, otherwise chaos ensues.

The most basic technique involves managing CAD files directly using standard Microsoft Windows file management. Released files must be separated from in-process design files; building new assemblies using existing assemblies was tricky; and files needed to be moved to different directories as they progressed through the approval process. Errors in linkage were often the result.

Solid Edge introduced Revision Manager in its earliest versions, which helped alleviate the situation by managing files at a higher level, and was a major improvement managing directories directly. In the mid 90's, even this level of file management was ahead of its time for a mid range system.

However, a next step was needed to extend the ability to view, inquire into, and manage data among all engineers, other authors, and other viewers in an organization. Better ways needed to be found to expose data captured within the depths of the CAD data. File names proved useless, often being related to part numbers. Finding parts by other criteria such

as material, geometry type, or even engineering change orders (ECOs) either became impossible or required violating the first deadly sin of databases – storing redundant data! Also, a way was needed to access important data contained with the typical CAD part and assembly files. Such data, often called property data, might include textual information describing non geometric information such as author, material type, etc. Drawings, within their text and title blocks contain additional data not stored in the property data. An example might be assembly instructions and references to more non geometric data such as “use lubricant before assembling” or manufacturing tolerances.

Thus, the need for a more sophisticated way

Microsoft's SharePoint Portal Server (SPS), a Windows 2000 Server-based intranet system, offers three main components: document management and version control; index and full text search of internal and external document sources; and the Dashboard portal site. Licensed on a user-seat basis, SPS is targeted for use on company intranets and extranets. SPS supports document publishing, subscription, and approval processes to streamline document sharing in an organization. Documents are easily accessible through the flexible Dashboard site or extensions

to manage data became obvious. How could such a task be accomplished, yet reuse historical data, provide extensibility as the Internet evolves, and, most importantly, not engage the user in a lengthy automation of existing processes (often called re-engineering)?

The developers at Solid Edge decided to base their solution on an already existing Microsoft

technology called SharePoint Server (SPS). SharePoint fit many of the desired needs for such a system, including automatic indexing of data contents, quick full text search, a database structure, and is part of the Microsoft .NET structure which allows ready incorporation of advances in network technology, and local and external access via browsers. SharePoint itself is based on Microsoft Server technology, thus enabling its complete server functionality. Solid Edge extended SharePoint so that it could manage the complexity of very large, interrelated CAD files, as well as the extended check out time required to modify such files. Key among these extensions is one that, hidden from the user, caches (temporarily stores) assembly data on the local workstation to speed up interactive data access. Thus users need not interact frequently with the SPS; Insight coordinates any necessary file updates.

In layman's terms, SharePoint enables easy searching and sharing of data stored within its workspaces as well as enabling Internet connectivity, a powerful advantage to access, update, and display of CAD data.

To find out how well all this actually works, we visited, early in October, 2002, EDS PLM Solutions' Solid Edge organization, at their marketing and development headquarters, in Huntsville, Alabama. We were particularly interested in exploring Solid Edge V12 with Insight and what it means to engineering data management and collaboration.

SharePoint Portal Server, the foundation for Solid Edge Insight

We began first by examining Microsoft's SharePoint Portal Server, which provides the backbone for Insight, Solid Edge's exciting product data management technology.

SharePoint by itself, even without the extensions made by Solid edge, has the potential to provide an exciting collaboration environment. In fact, after spending the better part of a day working with it and finally understanding its potential, I ordered it for our small organization. While the list price of SharePoint is \$5995 US, we found the street price to be less than \$1000. A prerequisite for SharePoint is Windows 2000 Server, starting at less than

\$1,000. In our estimation, the combination is reasonably priced. Users should also consider that most centralized data applications would likely require the robustness of Microsoft Server in any case. *SharePoint provides the underlying power to organize, manage, and allow sharing, not only of CAD data, but of all the myriad documents involved in design, a huge factor in its favor.*

Besides offering a data management system for storing, retrieving, searching, and versioning objects, SharePoint provides direct access by the Solid Edge menu and offers an easily customizable web based method of retrieving the data. Solid Edge's extensions make it a powerful data management system for engineering design teams. The best part is its ease of installation and administration. Readers interested in finding out more about SharePoint itself can visit <http://www.microsoft.com/SharePoint/>.

Metadata adds content knowledge

Metadata is simply data associated with files, not necessarily part of the file data, that adds to the descriptive content of the file. For instance, in this case, when saving files, users add such items as author, reason for the version change, engineering change order number, etc. Metadata can have required or optional information, the control of which is managed by the data administrator.

The assembly linkages are indexed as metadata, that is, the links within the assemblies are metadata links. This enables Insight to perform very rapid searches, such as for "where used" reports. You can also search content within the geometry files, such as the ability to search text blocks on drawings, a very impressive capability, since drawings contain scads of useful data.

Digital dashboard - an entry point for Insight access

SharePoint uses the concept of a digital dashboard, which is a web portal page providing access to the database and SharePoint functions, such as search, subscribe, and notices. Using what Microsoft describes as "web parts" an administrator can customize

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this page by changing its content or by modifying the HTML code. Anyone who has set up their personal page on yahoo.com will immediately understand what is meant by adding or deleting web parts.

The image on the right shows a sample dashboard web page. Note that it has been customized for a particular company, as well as containing the latest project data. Users can dig right into the design or use this page as a starting point for gathering additional information.

This example displays six web components, including QuickLinks announcements, subscription summary, categories, some project information, with a



SharePoint Portal Server creates a Web portal—known as the *dashboard site*—automatically during installation. The dashboard site offers a centralized access point for finding and managing information. By using a browser to view the dashboard site, users can perform document management tasks and find information. The dashboard site allows users to: browse through information by categories, search for information, subscribe to new or changing information, check documents in and out, review a document's version history, approve documents for publication, and publish documents. The dashboard site can provide access to information stored both inside and outside your organization, allowing users to find and share documents regardless of location or format.

Organizations can customize the home page of the dashboard site to display organizational news and other important information, using Microsoft Digital Dashboard technology to organize and display information. A digital dashboard consists of reusable, customizable Web Parts that can present information from a wide variety of sources, including Office documents and Web sites. You can add or remove Web Parts to customize the dashboard site for your organization.

Users can also create additional, customized “personal” dashboards to organize and present information that’s especially relevant to them, such as project- or workgroup-specific information. Users can add content to dashboards by creating Web Parts directly from Office XP or by importing Web Parts from a catalog.

center table explaining the current status of the project. This html code for this page was customized using FrontPage to add the project review table, the standard web parts, and links to related documents. Note that since we are signed in as an administrator, the menus at the top of the page allow administrative functions. Just below this menu resides a way to search the entire site for metadata or for the contents of data records. Microsoft has built sophisticated search mechanisms for searching various document types, such as Word documents, Excel files, etc.

SharePoint allows up to 15 workspaces. We’re exploring just one of those workspaces.

Assessments: Very impressive, highly customizable, looks relatively easy to maintain and link to other parts, really like the ability to do complex metadata searches.

Searching for completed ECOs involved no more than clicking on QuickLinks, which resulted in a response that listed the documents containing the particular ECO which contained the number we entered. We could then choose to view the document, discuss it, and subscribe to it if it changed. Subscribing to a document, notifies the subscribers via e-mail, whenever any changes are made.

Installing SharePoint Server definitely requires some IT skills, typically from a

network administrator. Installing SharePoint at our TechniCom site onto an already existing Windows 200 Server proved the need for such skills. However, with a little advance planning as described in the installation manual, a clean install of both products should be possible by a non expert, in less than one day. To start, SharePoint adds users automatically that are already assigned as users on the network. User can then be assigned to the proper security category associated with project folders (coordinator, author, or reader).

Users uncomfortable with or lacking experience installing server software should contract with their reseller for these tasks. Planning is required for the proper organization of documents, part files, and other data to be stored within the Insight data base. Solid Edge can supply users with recommended data organization best practices. Many users, will no doubt begin by using their existing data structure as a starting point.

Transitioning to Insight proves straightforward for existing customers

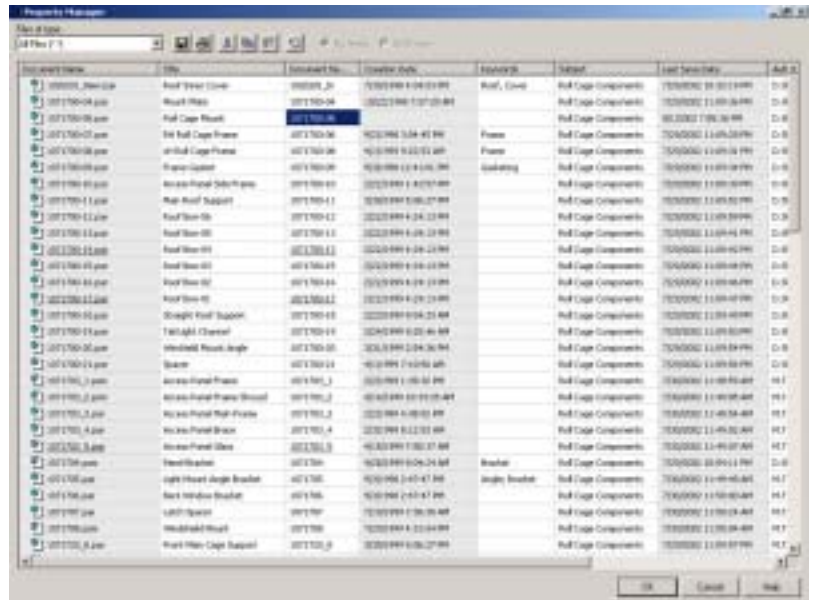
Assuming a new user of Solid Edge, what would have to be done to install Insight?

Insight Connect (a standalone version of Insight) can operate independently of Solid Edge to manage files kept in the managed workspace. This turns out to be very handy for existing customers to convert existing data to Insight managed data.

First, the user would run Insight Connect and allow the system to examine standard Solid Edge files for broken links. That is, links between assemblies and parts that might be broken. If they are broken then they must be repaired within Solid Edge before moving to the next step in the transition. Parts might have been unintentionally moved and placed in other directories. Once these repairs have been made and an assembly has no broken links, it can be added to the workspace. Before import though, metadata should be added to the property sheet describing each part. Instead of adding property data for each part, one at a time, V12 now provides a table

for quickly editing the metadata for all parts.

With clean linkages and the metadata added, we can import each of the assemblies or groups of assemblies located in a folder, into the managed workspace.



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000001_Rev_001	Part Year Class	000001_04	7/20/2009 9:19:13 AM	Rev_4	Good	7/20/2009 9:19:13 AM	0:0
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Our assessment of transitioning to Insight

This checking, while it sounds tedious, is important and can be done quite rapidly, allowing users to get up to speed quickly with Insight. The transition methodology offers a natural migration of data, which appears easy to do, including adding metadata, and having Insight automatically extract property data directly from the CAD file. *We like the fact that there is no need to re-engineer business processes.* Users are able to work using the same overall methodology that worked for them before they had managed and controlled workspaces. In essence, Insight adds control to the management of engineering workgroup oriented data. Key benefits are that the data can now be much more easily searched and managed, but additional project documentation such as specs and ECO's are as easily managed as the CAD data — all while still allowing engineers maximum flexibility.

Insight uses predefined workflows. This contributes to initial implementations being shorter than systems that require custom

workflow definitions. Pre-existing approval processes are not required to change, except that accurate, up-to-date data becomes more visible to all parties.

All Solid Edge assemblies then reside in the documents folder within the Insight managed workspace. Other workspaces (up to 15) can be defined. Think of these managed workspaces as vaults for all valuable data, with controls for adding, updating, and backing up these valuable goods.

How well does it work for the designer? (Or, how does it integrate with Solid Edge?)

We now want to work with one of the managed folders - an industrial vehicle assembly. To make a new rear wheel assembly, we opened up the assembly and saved it under a new name. *Solid Edge generated a new assembly that pointed to all of the existing parts, so we didn't have any part duplication.* A very nice feature! Then of course, the engineer/designer would perform his normal update of whatever the new rear wheel assembly is. He might delete a part or change a part's name and that would be filed with the new assembly. Again, very impressive, easy import, easy to use system.

One key we always consider is what does the system offer the user. Does it make his task easier or harder? Are there more subtasks that need to be done when opening or saving data that offer little in return. Is filing and retrieving data for design easier or harder? It turns out that rather than bolting on an external system, Solid Edge deeply integrates Insight. Users need not perform extra steps to use Insight organized data - it just happens.

Solid Edge also allows the user the ability to use local file folders, in addition to working with managed folders, managed by Insight. This could prove useful in initial designs where there is no need to share data or if Insight is not installed. When using managed data, Solid Edge uses a local cache that speeds up the process of opening and closing files. This local cache is transparent to the user and is one of the extensions made to SharePoint by Solid Edge. It extends SharePoint's efficiency in managing large file sizes and their complex relationships inherent in CAD data. When the user closes his working environment, only those files that have

changed are resynchronized with the server (called SmartSync).

Working with an existing assembly to add a new part

By opening the assembly, the system loaded the industrial vehicle assembly into our local workspace (the cache on our local machine). If the cache happened to be empty, the system would automatically load the entire assembly onto our local machine from the managed workspace on the SharePoint portal server. Once we had the entire industrial vehicle assembly loaded, which took a few minutes but only needed to be done once during the working session, we zoomed in on the cab by selecting the cab configuration. Not small, the industrial vehicle assembly has about 600 parts. The cab configuration had a sub-configuration for the steering wheel assembly.

An improved UI

In this version, all of the icons are updated to XP level with color and high contrast. The edge bar, as in previous releases, has five tabs: assembly pathfinder, library, alternate assemblies, sensors, and select tools. A new function allows double clicking on the pathfinder part in the edge bar to edit the part. We really liked the new way the system transitions to various viewpoints - a slick animation called dynamic view transition that depicts view orientation changes, making it much easier to understand where your viewpoint has changed to, rather than just snapping to a new viewpoint.

Adding parts to this large assembly

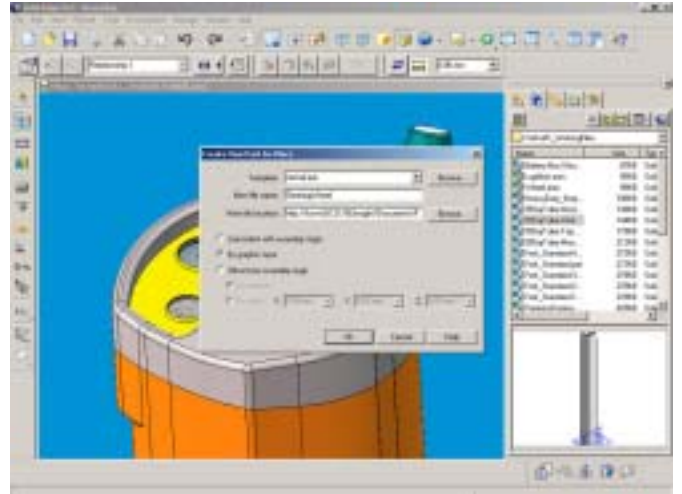
When open, some of the industrial vehicle assembly parts are dimmed in the Pathfinder and some are bright. The dimmed parts are not active, but show the part in the geometry window. We can either double click on the part in the graphics window or on the part in the pathfinder feature tree to activate the part. There is one configuration in this model. Next, we opened the cab components and "drilled down" to the steering wheel configuration. To create a new part in the context of the assembly, we select the parts library tab, select create new part, create in place. A dialog box asks where to locate the part in relation to other parts in the assembly. We define the XYZ planes by picking locations on existing parts that define its base location. We

start modeling the part by initially using drag and drop functionality to build the spline from the spline library and continued until we completed the new steering wheel. The two images below illustrate this.

We closed the part and returned to the top level of the assembly, still not uploading anything to the server. Next we changed the rear wheel assembly, by assembling wheels and lug nuts. New for V12, clipping planes allow us to move dynamically through the assembly, viewing internal parts, and making it easier to select otherwise hidden elements on which to place parts. We completed the wheel assembly by mating the first lug bolt onto the wheel, then copying this part using a pattern to complete the wheel. We added a cap onto the wheel by dragging the desired cap from the library. *A transfer function enables you to transfer a particular part to different assemblies.* Once we placed our cap onto the wheel assembly, it automatically replicated the cap across both wheels in the assembly.

Updating the server data

Now that we are finished changing the assembly, we close the assembly and save it. In doing so, Solid Edge uses SmartSync to update only those items that have changed. A dialog box allows us to add a new version

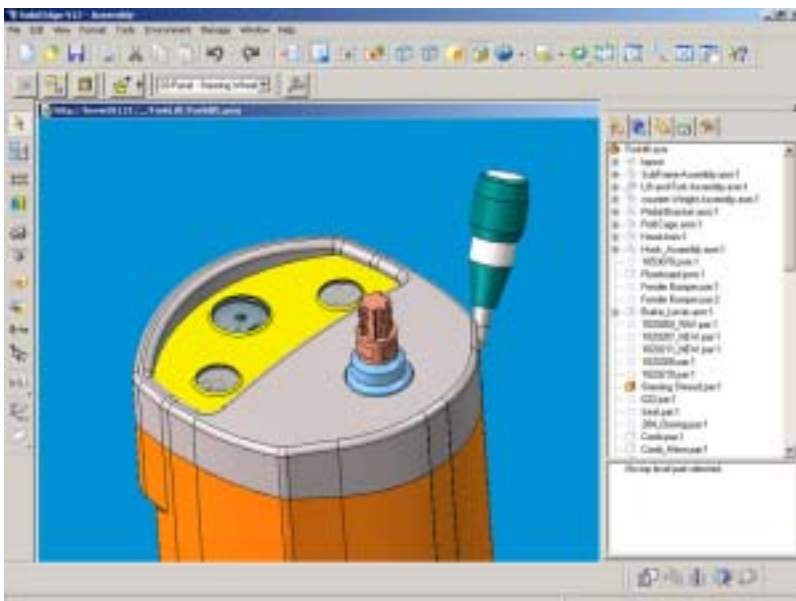


takes the files we updated, checks them back into the data base, and publishes the new version to the server. If desired, you can keep the data on your local machine without updating the server, possibly updating only at the end of the workday. After synchronization, anyone subscribed to any of the parts or assemblies that changed, would automatically have an e-mail notice sent to them that a new version has been published. When they view the portal page (digital dashboard) they will see the updated change noted.

Other modeling functionality in V12

XpresRoute

Solid Edge Version 12's XpresRoute incorporates processes that allow users to readily create tubing and wiring into the assembly model. Wiring includes both individual wires and cables (cables contain multiple wires). We had a look at the ability of XpresRoute that was actually process specific in terms of what we were trying to do. Some of the alternatives we examined were wire and cable, flexible tubing, and rigid tubing, such as for instance, copper tubing. The toolbar that appears on the left side of the menu is oriented such that we follow the required steps in a sequential manner. Further, additional functions are added to the tool bar that are specific to this particular process we are trying to do. Thus,



comment, possibly adding text describing the changes we made to this version. SmartSync creates a new version of the assembly; it

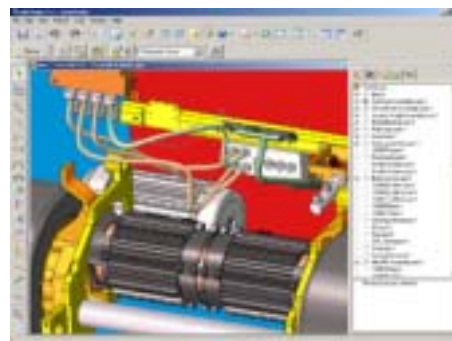
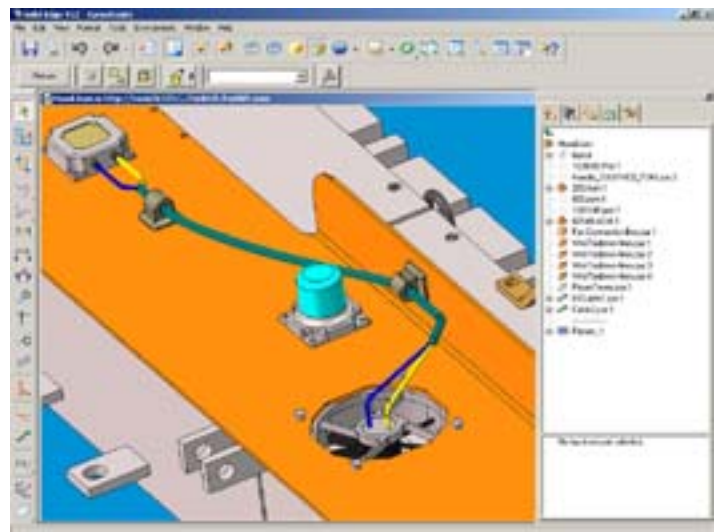
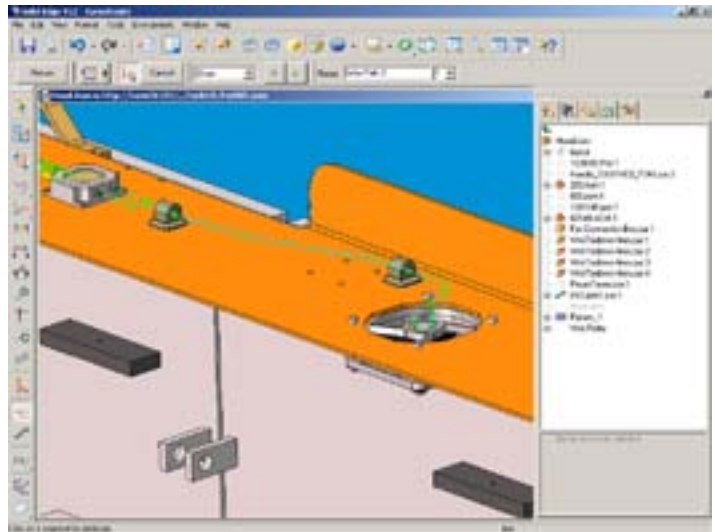
Solid Edge builds specialized functions rather than requiring the user to deal with only generic solid modeling functions. For instance, the system requires us to first define the path, then to define the cables and to what points they connect, then to model the cables, and lastly to route the cables, typically by selecting points along the desired route. Cables can have their path altered manually, or will automatically follow changes in parts through which they are connected. In one case, modifying the location of one of the grommets through which the cable passed, caused the entire cable to redefine itself to its new physical path. Tubing follows a similar paradigm. Tubes and wires are part of the assembly and are stored along with the model. The following images illustrate a wire path, how it can be changed as the model evolves, and a sample of flex tubing design.

Assessment: We liked the integration, the guidance provided, and this process driven approach embodied within Solid Edge that makes tube and wire modeling easier to use. Most assemblies will require one or both of these functions, particularly in machine design. While XpresRoute does not check the electrical efficacy of the connection, third party software can be added to do so.

Surfacing additions allow cleanup of imported geometry

Surfacing, new in V12, focuses on re-pairing imported geometry. The overall process is to first analyze the imported geometry to test for and show any non-stitched edges. The system displays those areas of solid model that have surfaces missing. To repair missing surfaces a number of tools were available. We were able to place bounded surfaces using edges, build a derived curve from multiple curves to clean up the resulting surface, and were able to stitch new surfaces onto the imported geometry. When we had a fully enclosed solid we were able to create a solid based part. A good example is shown below (Non-Stitched.jpg), where there are faces missing and untrimmed surfaces present in the imported model.

A second example showed how we were able to extend and trim surfaces to clean up an imported part. A visually examination of the



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part and let us determine how to modify the geometry and stitch in newly created surfaces to create a fully enclosed part.

We also had the ability to heal overlapping surfaces. To do this we need to select individual surfaces from the original part, copy them onto a new surface, delete the surfaces from the original part, and then trim or extend them to create a fully bounded solid model. One example is shown in Trim.jpg, where we trimmed the cylindrical surface shown by the red arrow which, when imported, had extended below the planar face.

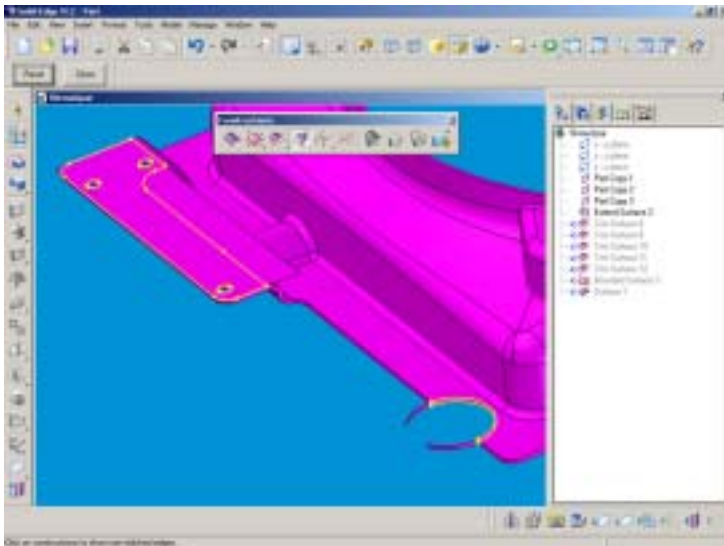
Assessment: Solid Edge has some rather nifty tools added to V12 to clean up imported parts. A discussion with the head of development revealed that additional surface modeling may be available in a later release.

Drafting and 2D to 3D

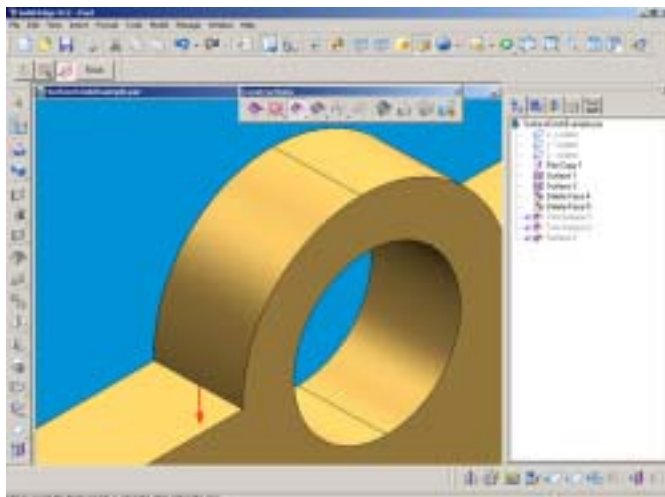
V12 also added substantial new functionality to drafting 3D models. Placing views and automatic ballooning for bills of material are a much faster than before. Section views can now include sections of sections and auxiliary views of auxiliary views. Users can now drag views directly off of other views by just dragging in the proper direction, including isometric views. Smart dimensions have also improved. Solid Edge drafting, instead of simply viewing 3D objects, actually creates draft entities that are created from and related to the 3D solid model. This technique provides more flexibility. Even if the model is not there, the drafting entities still remain. I like this better. It's easier to work with and more reliable.

Conclusions

- Insight offers a powerful technique for searching for data, including property and drawing data blocks
- Insight is easy to install without re-engineering processes
- Minimal IT resource is necessary for Insight installation and maintenance
- Simple built-in workflows allow secure data updates
- Automatically versions changes to parts and assemblies
- Allows easy creation of new assemblies from existing assemblies
- Allows storage of any type document within folders
- Custom project web pages are easily developed using Microsoft dashboard technology, a huge productivity improvement for design teams
- "Subscribing" allows interested parties to be notified by email when changes are made to documents that might effect them
- Keeping all data in a central workspace



Non-stitched.jpg



allows central backup of crucial files without user intervention

- Existing Solid Edge sites have a straightforward process to not only ease the migration to Insight, but validate existing data and readily add metadata to models to enhance searches

We highly recommend Insight and believe that installations with such a data management and sharing system will dramatically increase their productivity.

About the author

Raymond Kurland is president of TechniCom and the editor of the TechniCom eWeekly. His firm specializes in analyzing MCAD systems and has been involved in reviewing and comparing such software since 1987.



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Solid Edge Insight Functionality

- Vaulting with check in / check out
- User roles (clear, pre-defined)
- Full text search across multiple servers
- User defined attributes
- Version & revisions, including revision history
- BOM Management
- Where used
- Work flow (simple & pre-defined)
- Local cache with server synchronization and off-line support
- Vaulting of any type of file
- Multi-server support
- Open access to attribute data
- Easy to install, easy to use

Solid Edge®

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