

Improving the Altium ECAD / MCAD Connectivity Experience Q & A

Though this webinar was to demonstrate the collaboration between SOLIDWORKS CAD and Altium Designer utilizing SOLIWORKS PCB Connector, there are also generic references to ECAD (Electronic Computer Aided Design) and MCAD (Mechanical Computer Aided Design). These terms include not only the tools, but the work flows and design methods of each discipline as well.

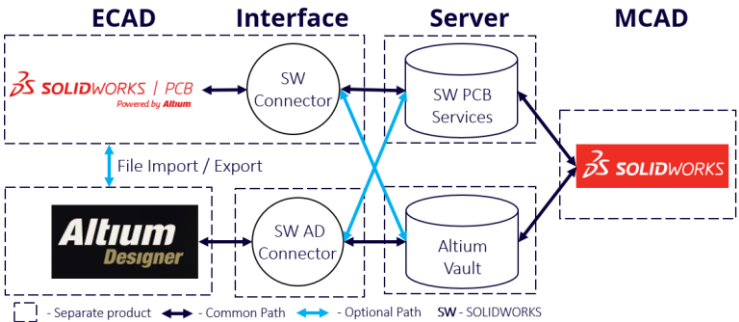
The mechanisms used to locate objects in ECAD tools is different from those used in SOLDIWORKS CAD. This makes the effort a bit more challenging. ECAD works in grids using the classic Cartesian X and Y plane. This, in essence, is an ‘absolute’ reference system.

MCAD uses the concept of ‘relations’. By defining the relation as being parallel, cotangent, perpendicular, etc. and their distances between the two lines that make up their part, they are using a ‘relative’ reference system. For the ECAD folks, this is why various types of 3D bodies / objects initially brought into Altium Designer may come in upside down or on their side – there is no universal definition of an origin when 3D bodies/objects are drawn in a ‘relative’ environment.

For clarification purposes, we will refer to SOLIDWORKS 3D mechanical design environment as ‘SOLIDWORKS’ as ‘SOLIDWORKS CAD’ or ‘SW CAD’. We may also abbreviate the word SOLDIWORKS as ‘SW’. The Altium Designer extension necessary to allow Altium Designer to communicate with SOLIDWORKS PCB Services may have been referred to as the ‘the connector’ during the webinar. Its official name is SOLIDWORKS PCB Connector for Altium Designer. In this commentary it will be referred to as ‘SOLIDWORKS PCB Connector.’

The phrase “Changes are not summarily initiated” in some of the comments below is important. This means that a change pushed to either the ECAD or MCAD design side does not *automatically* initiate a change of the other side. For example, a change initiated by the MCAD side will show up as detected or pending on the ECAD side automatically. However, the change must be reviewed and *accepted* on the ECAD side before it is actually implemented by the host CAD tool. The converse is also true.

Questions / Comments	Answers / Response
Electrical side defines the SIZE [of the board], not the shape	This is generally true. The fact of the matter is that the component bodies and the number of pins that need to be routed will ultimately dictate the real estate size of the board. This can be somewhat alleviated by flex-rigid and adding more layers; however, the tradeoff will be design time and cost. As for the shape of the board, this should be defined by the mechanical side of the design, though we are speaking in generalities. The board’s purpose may dictate some design guidance from the electrical side.

<p>What system are you using to host your SOLIDWORKS PCB Services?</p>	<p>This question can be interpreted in two ways; therefore, we will respond accordingly:</p> <p>For our webinar presentation, the system we were using is a Dell PowerEdge R210 computer with Microsoft Windows 7.</p> <p>As for SOLIDWORKS PCB Services itself:</p> <p>SOLIDWORKS PCB Services utilizes a Firebird database and http or https communication protocols to facilitate the various collaborative operations between Altium Designer and SOLIDWORKS CAD. Installation and hosting of PCB Services is done on a network machine or server that is commonly accessible to any ECAD and MCAD users needing to collaborate.</p>
<p>[By] using the connector does the SOLIDWORKS CAD assembly still pull 3D data from the Altium footprint library?</p>	<p>The 3D models being passed through SOLIDWORKS PCB Connector from Altium Designer to SOLIDWORKS CAD are native SOLIDWORKS Parasolid-formatted models that are derived from the 3D body (Extrude, STEP, Parasolid, or SW Part.) This 3D body is defined as part of the library (Footprint) component. As the Parasolid files are pulled into SW CAD they are saved as individual parts, and along with the board outline, are combined into an assembly of the PCB.</p>
<p>Is it installed on a server?</p>	<p>Since the question may be asking different elements of the collaboration, the response will try to clarify.</p>  <p>SOLIDWORKS PCB Services should be installed on a network machine or server that is accessible to all ECAD or MCAD users that need to collaborate. SW PCB Services provides the communication and transportation mechanism between the ECAD and MCAD tools.</p> <p>It is important to note that the ECAD and MCAD tools work in their native file formats and are saved locally to their</p>

	<p>respective user's harddrives.</p> <p>If the concept of SVN revision control is new to you, please refer to our webinar on this topic https://www.ninedotconnects.com/video-svn. Keep in mind that one never works in the SOLIDWORKS PCB Server itself. Information is pulled and pushed from the server.</p>
<p>How does a server implementation and all of the changes being made here interface on a PLM implementation?</p> <p>How would the versioning between Altium and SOLIDWORKS interact with an external PLM versioning control system such as Windchill</p>	<p>Collaborative changes to the ECAD and MCAD design files are being made at design time inside the respective CAD tool. Once the design files themselves (SW assemblies or PCB design files) are saved natively, they can be managed by a PLM /PDM system as appropriate / needed.</p>
<p>What about keepouts, keepins, etc.?</p>	<p>Collaboration of keepouts, keepins, etc. between ECAD and MCAD is something we are looking at as a potential enhancement for a future release.</p> <p>This is an area of the collaborative design flow we are soliciting feedback and input for from users.</p> <p>In the meantime, with the recent 2018 release, non-electrical 3D bodies / object can now be passed from SW CAD to AD. While not a formal keepout, such a 3D object can be used / utilized as a mechanical-driven barrier to PCB component placement.</p>
<p>Does ECAD own the relationship between the footprint and the SOLIDWORKS model? If so, what if you start with a push from MCAD to ECAD where there is not a relationship yet?</p>	<p>Currently, ECAD owns the relationship between the PCB footprint and the defined 3D body for a library device / component.</p> <p>Starting with the recent 2018 release, non-electrical 3D bodies / objects can now be passed from SW CAD to AD. Once pushed to PCB, they become unassociated 3D objects on the PCB.</p> <p>Collaboration of electrically-aware components from MCAD to ECAD is something we are looking at as a potential enhancement for a future release. This is an area of the collaborative design flow we are soliciting feedback and input for from users.</p>

<p>In a contract manufacturing environment with customers using different install base of SOLIDWORKS, how is the data pushed when there is no common server?</p> <p>Regarding no common server - We cannot interlink common servers to all of our different customers. Would it make more sense to push / pull data to a vault or link to an FTP site?</p>	<p>The purpose of SOLIDWORKS PCB Connector is to provide collaboration between the ECAD and MCAD tools in near real time. If the company is willing to provide a login to their SOLIDWORKS PCB Services to facilitate ECAD-MCAD-driven changes / communications to the CM, the CM will need to have appropriate / supported version of SOLIDWORKS CAD.</p> <p>Keep in mind that the power of this capability is during the design process. If one is handing off designs to a CM or a customer at the end of the design process or occasionally to provide updates, then it makes sense to use an FTP site instead.</p>
<p>Many times when exporting a STEP from Altium to SW [CAD], geometry breaks somehow so instead of an assembly of solid models I end up with a collection of surfaces. How does the connector avoid or handle broken geometry?</p>	<p>In general, if a part in SOLIDWORKS CAD cannot be created from the resultant Parasolid derived from the defined 3D body in the PCB component / device due to invalid or broken geometry, it will usually result in an empty or suppressed part in the Assembly.</p> <p>What we must understand is that a 3D representation of a component on the ECAD side has meaning on the MCAD side beyond aesthetics. When a 3D representation is brought into SW CAD, it is being scrutinized in a similar way that the Design Rule Checker (DRC) in Altium Designer will interrogate a PCB that has been opened or edited. SW CAD wants to know if the relationships between the sketches that make up the part are correct. It will not render it if it finds issues with the relations.</p>
<p>Anything in the works for having Altium exporting silkscreen layer(s) to a mechanical file?</p> <p>Can you export silk?</p>	<p>Collaboration between ECAD and MCAD that includes silkscreen information is something we are looking at as a potential enhancement for a future release. This is an area of the collaborative design flow we are soliciting feedback and input for from users.</p> <p>Note: During the Q and A of the webinar, it was suggested that a way to export the silk was to use the Parasolid export function in Altium Designer. The procedure was to copy the silk onto a signal layer since mechanical and special layers cannot not be exported though the Parasolid. However, this will not work because the Parasolid is designed to export copper and components, not the designator primitive.</p>

<p>How are conflicts handled by SOLIDWORKS PCB Connector?</p>	<p>SOLIDWORKS PCB Connector itself is only an integrated conduit through which changes and communications are passed between ECAD and MCAD. Conflict resolution is incumbent on the users who can choose to accept the inbound changes or not. Changes are not summarily initiated.</p>
<p>How does the connector system handle mates in SOLIDWORKS [CAD] if for example the mechanical engineer sets a component in a particular location using mates and the EE moves the component?</p>	<p>In SW CAD, modifications (including mates) to the PCB assembly, or a larger assembly includes the PCB assembly, are retained in the saved assembly. SOLDIWORKS PCB Services nor SOLIDWORKS PCB Connector for Altium Designer specifically "handle" mates, only changes being passed between ECAD and MCAD. Movement of a mated part would be the same as a move initiated manually. Also, any change through SOLIDWORKS PCB Connector must be accepted first. Changes are not summarily initiated.</p> <p>Solidworks has created a 'Best Practices' document as it relates to modifications to the PCB assembly in SW CAD which provides a more in-depth answer</p>
<p>How is the board origin handled between AD & SW?</p>	<p>If the board is being pushed from the ECAD side to the MCAD side, the origin is established by coordinates of the ECAD tool. If the board is started on the MCAD side, the plane and origin are initially set by SOLIDWORKS PCB Connector.</p>
<p>How does the system handle something like dimensions in the PCB outline sketch?</p>	<p>If the board is started in the MCAD tool, it knows the dimensions of the individual sketches that make up the board. This information is process by SOLIDWORKS PCB Connector for translation onto the grid.</p>
<p>Can the MCAD side influence board thickness by changing the extrude thickness?</p>	<p>The thickness of the board is handled by the ECAD tool. The electrical layer stackup defined by the EE / PCB designer will determine the board thickness.</p>
<p>How are the connector project files handled if you link the MCAD and ECAD drawings in a PLM instance?</p>	<p>SOLIDWORKS PCB Connector itself does not create projects files; it facilitates collaborative changes to the native ECAD or MCAD design files at design time. Once the design files themselves (SOLIDWORKS assemblies or PCB design files) are saved natively, they can be managed by a PLM /PDM system as appropriate / needed.</p>

Can the components in the PCB assembly be mated to a SOLIDWORKS Mechanical Assembly Layout?	Once the PCB assembly has been created in SW CAD, the PCB "components" are normal SW Parts. Once the PCB assembly is added to a larger assembly, parts can be mated as usual.
You can export a DXF/DWG of mechanical layers	Not through SOLIDWORKS PCB Connector; However, Altium Designer supports the import and export of DXF/DWG files.