



DXF and XML structure requirements to import to ACD

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The primary data structure used in the ADVANCED CHANNEL DESIGN (ACD) program to describe a channel is the Face. A face defines a bounded plane and is comprised of 3 or more points. Each point or 'Node' is a location in 3-dimensional space and thus contains one each of an x, y and z scalar component. If we imagine a simple, straight channel with a flat bottom and sides connected to that bottom then the channel would be comprised of a total of 3 faces—1 for the bottom and 1 for each side. In this example, each face would be made up of 4 nodes. By sharing some of the nodes between the faces, we ensure no gaps in our channel sneak in. By sharing, we have 8 unique nodes instead of 12. In the picture below nodes 3, 4, 7 and 8 are used by more than 1 face. We can also notice upon visual inspection that this channel flares on the sides. We would more technically define this as slope. By simply adjusting the x, y, z values for nodes 1, 2, 5 and 6 we can change the slope of the sides without interrupting the continuity of the connection to the bottom.

FIGURE 1. Simple Channel

ACD has built in editors to allow the creation and editing of nodes and faces. The Nodes tab provides a spreadsheet to input the X, Y and Z dimension for each node. The Faces tab provides a separate spreadsheet where nodes can be collected into faces. Nodes should be space delimited and connected in a counterclockwise orientation. There is a no need to 'close' the face by repeating the initial node; this is done implicitly.

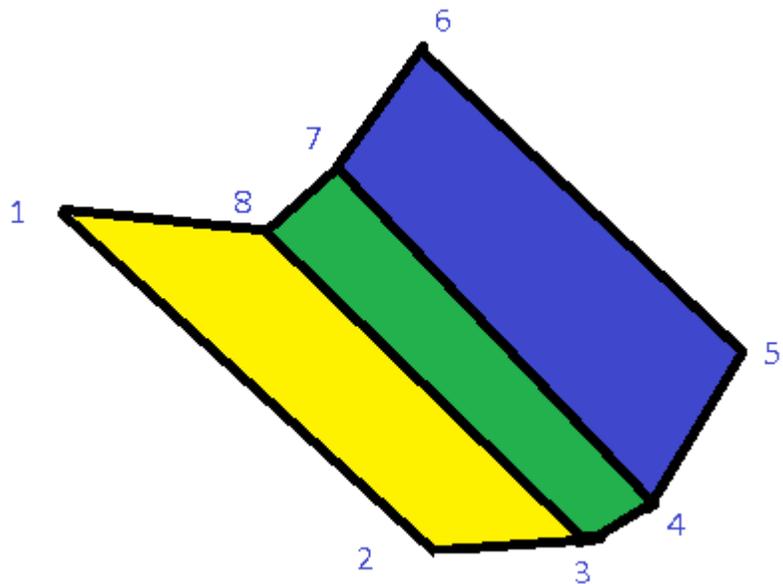
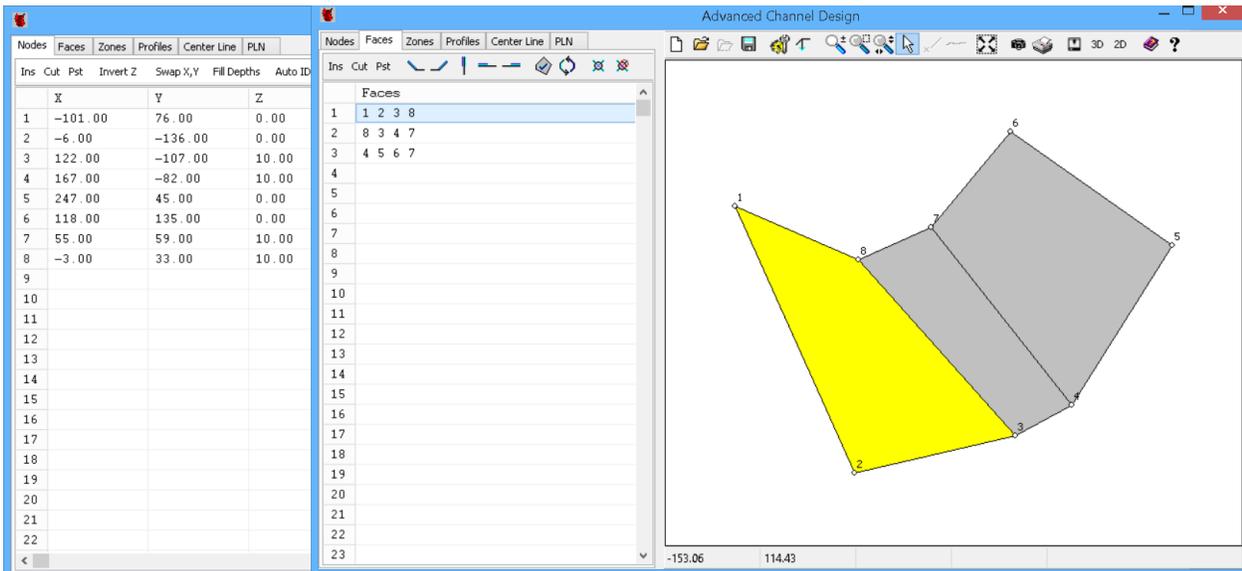


FIGURE 2. Sample Channel in ADVANCED CHANNEL DESIGN—Nodes (left), Faces (center) Channel Preview where the selected face is yellow (right)



For creating simple channels from scratch or simply inputting a series of known nodes, this manual method is quite acceptable, but as the complexity of the channel increases it becomes less efficient. Tools are provided in ACD to design channels around known information like a center line or channel plan file. (See the documentation for more details on these methods.)

IMPORTING DXF FILES

Another avenue to explore is bringing in channel information already built in an external package. The preferred design tool for many engineers is Autocad and they are quite proficient in its use, so the ability for ACD to ingest this information is a valuable time saver. It also eliminates transcription errors. Autocad DXF files can encode a large number of various entities, but for ACD the important one is the '3D Face' object. The 3D Face maps perfectly to the ACD 'face' element. The nodes are extracted from the DXF and added to the Nodes tab. Similarly, the Faces spreadsheet is automatically imported and populated.

To access the function, click the Open icon and select the DXF File 3D Faces (*.DXF) option in the file filter. Select your file, click [Open] and the job is complete.

IMPORTING LANDXML FILES

There is another popular format from which ACD can import a channel definition known as LandXML. This is a standardized exchange format encoded on top of XML, used heavily in civil engineering. LandXML was designed to exchange engineering design data and, as such, may contain a wide variety of different elements. However, like the DXF import, we are interested in a particular encoding which makes sense given the purpose of the program. For LandXML, this is the Surface object. Each Surface contains both a list of Points and a list of

Faces. The faces can either be of type TIN or GRID consisting of 3 or 4 points respectively. Upon import, ACD parses the file and any surface found is decoded and added automatically to both the Nodes and Faces spreadsheets. If you are interested, we are considering adding the ability to export our channels to this format. Send us feedback if this feature would be important to you.