DXF Model

DXF or Drawing Interchange File is a standard ASCII text file format widely used for transferring 3D data among CAD and other 3D graphic applications including rendering and animation programs. TREE implements DXF format for exporting the 3D tree models that strictly follows the AutoDesk's standard. The TREE's DXF files carry full 3D geometry and color information on up to eleven (11) structural layers.

Following are the broadleaf tree layers with their respective names:
1. Trunk carries the trunk.
2. Bough carries the boughs.
3. Branch1 carries the first generation branches.
4. Branch2 carries the second generation branches.
5. Branch3 carries the third generation branches.
6. Twig carries the twigs.
7. Stem1 carries the leaf stems for the leaves colored with Palette 2.
8. Stem2 carries the leaf stems for the leaves colored with the Palette 3.
9. Leaf1 carries the leaves colored with the Palette 2.
10. Leaf2 carries the leaves colored with the Palette 3.
11. Envelope carries the tree crown's envelope.

Following are the conifer tree layers with their respective names:
1. Trunk carries the trunk.
2. Bough carries the boughs.
3. Branch1 carries the first generation branches.
4. Branch2 carries the second generation branches.
5. Branch3 carries the third generation branches.
6. Twig carries the twigs.
7. Needle carries the needles.
8. Envelope carries the tree crown's envelope.

Following are the palm tree layers with their respective names:
1. Trunk1 carries trunk shaft.
2. Trunk2 carries ring parts if Ringed Texture (TT2) is selected or dry stems if the Dry Petiole (TT3) is selected.
3. Trunk3 carries tops of dry stems if the Dry Petiole (TT3) is selected.
4. Crownshaft carries the crownshaft.
5. Stems1 carries stems colored with Palette 2.
6. Stems2 carries stems colored with Palette 3.
7. PrunedStems carries pruned stems.
8. Leaflets1 carries leaflets colored with Palette 2.
9. Leaflets2 carries leaflets colored with Palette 3.

TREE is building the polygonal model as it is saving it in a DXF file. Thus, the

rendering on the canvas is just a preview. Once you have the correct parameter settings for a particular tree, you can interrupt the rendering anytime and proceed with saving the tree as a DXF file, or you can skip the rendering all together and proceed directly with the saving.

ach class of tree or palm elements can be modeled at up to three different levels of detail, or it can be excluded from the model all together. For example, if you check Complex for the trunk, the trunk will be modeled as a sequence of cylindrical segments of the chosen transversal resolution. By checking as PLine or as Line, the trunk will be modeled as a sequence of one-polygon segments and as a sequence of lines, respectively. If all three check boxes are unchecked, the trunk will not be modeled. This applies to all other elements except for the leaves in broadleaves, the envelope in broadleaves and conifers, and the leaflets in palms which are modeled as sequences of one-polygon or line segments.

When you select any of the modeling options for any class of tree elements, you get an instant feedback on the number of polygons for this particular layer (L/P No. column) and its fraction relative to the overall size of the file (Fraction column). Thus you see not only the size of this layer in terms of absolute polygon numbers, but also its impact on the overall size of the file. And this information will help you to choose the most effective strategy in lowering the number of polygons for a particular tree.

When you press the Count button, TREE counts the polygons for a particular

tree model and displays the overall size of the file in polygon numbers and megabytes at the bottom left corner of the dialog.

Transversal Resolution defines for each cylindrical segment of a particular class of tree elements the number of polygons it is composed of. You can adjust the transversal resolution of each class of tree elements independently. The transversal resolution may vary depending on the fidelity requirements for a particular tree model.

For broadleaf trees, we have provided you with an additional option, Foliage Reduction, for reducing the amount of leaves on the model. If the amount of leaves on a particular tree contributes substantially to the overall size of the file, you can reduce the foliage amount by entering the reduction percentage in the Foliage Reduction field and see instantly how it affects the overall size of the model.

Flat leaves check box allows you to choose whether to model each leaf as a planar or non-planar object.

For conifer trees, we have provided you with the Abstract needles option, an additional mechanism for reducing the file size dramatically. As anyone who has dealt with conifer tree models knows, the needles are usually the largest contributor to the overall file size because each needle is modeled as a separate object. If you check Abstract needles, each branch segment populated with needles will be modeled as two crossed polygons which will spare you a lot of polygons and will work fine for background and middleground positionings where the detail is not necessary.

In both, broadleaf and conifer tree models, you can choose to model or not to model the caps on the top of branches by checking or unchecking the Model caps check box. The caps on branches may be important for close-ups, but for average camera movements, you can get away without modeling the caps and save some polygons.

How to Make a DXF File Smaller

Once you create a tree you like, you will probably want to save it as a DXF model. You may find that the model will take too much space and will take too long to render, but you do not want that. The only solution then is to make the file smaller. There are numerous ways to cut down the number of polygons in the file. The strategy you take will depend greatly on your priorities with respect to the model. You will have to compromise on, at least, one of the three fronts: the modeling quality and detail, the amount of branches and leaves, and the size of a tree.

Keep in mind that the effectiveness of any of the moves you make to reduce the size of your file will depend greatly on the bottlenecks in your model. Thus, if your biggest problem are the branches, it will be prudent to concentrate on them as opposed on, for example, leaves, and vice versa.

Below are our general recommendations on how one might go about making the tree DXF file smaller.

1. Do not model twigs and leaf stems.

2. Model branches of the second and third generation (Branch 2 and Branch 3) as polylines.

3. Model the trunk with the transversal resolution of maximum twelve (12) sides.

4. Model the boughs and branches of the first generation with the transversal resolution of maximum five (5) sides.

5. Do not model the caps on branches.

6. Choose ovate or oblong leaves. Those two leaf types are modeled with one polygon.

7. If, after you have selected ovate or oblong leaf type, you still have a problem with the leaves, reduce the foliage amount accordingly. Try to find the best compromise between the most desirable amount of leaves and the size of the file. You may even consider the tree without leaves. Our models are as photorealistic without the leaves as they are with the leaves.

If your model is a conifer tree, you may expect the file size problems with the needles. There are few things you can do to reduce the amount of needles on your model:

1. Increase the distance between the needles by adjusting the Needle Density parameter. You may increase the length and width of needles in the same time to create the impression of quantity. You counteract the lack of quantity with the increased mass of each needle in order to preserve the tree’s visual identity.

2. Adjust the Needle spread parameter so that the needles occur at the tips of branches only. You will not jeopardize photorealism since this is how needles grow very often on conifer trees.

3. If you do not want to have bare branches, play with Density change. This

parameter causes variable density of needles. The needles become denser as they get closer to the tip of a branch where you need them most.

4. DO NOT allow the needles to curve. Keep the Needle Curving parameter at zero (0).

5. Model the needles as polylines or lines.

6. If, after all of the above, your file remains too large, abstract the needles by replacing them with the compound, two-polygon objects (check Abstract needles in the DXF Dialog).