

Final Report - MaterialsAC Summer 12

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Introduction

I investigated the error that occurs when rendering materials within the plant design drawings. When applied correctly, the MaterialsAC Mathcad code within the Final Designs, AutoCAD script file will render the listed materials into respective layers within the drawing. For example for the following code:

```
-layer
```

```
material
```

```
Flat - Polished Gray
```

```
*con
```

will search for all layers ending with “*con” (a.k.a. concrete layers) and apply the “Flat - Polished Gray” materials to the layers specified. The final design, when every material is applied successfully, should look as follows (1)(2):

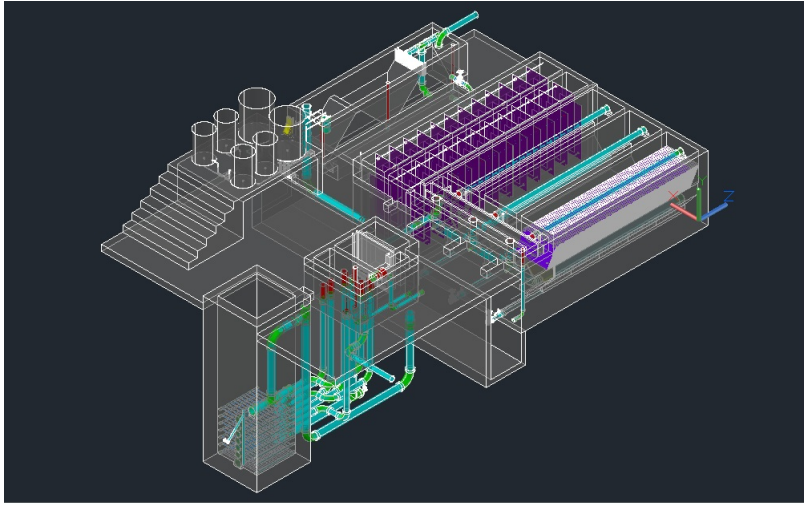


Figure 1: Plant Drawings before Applying Materials

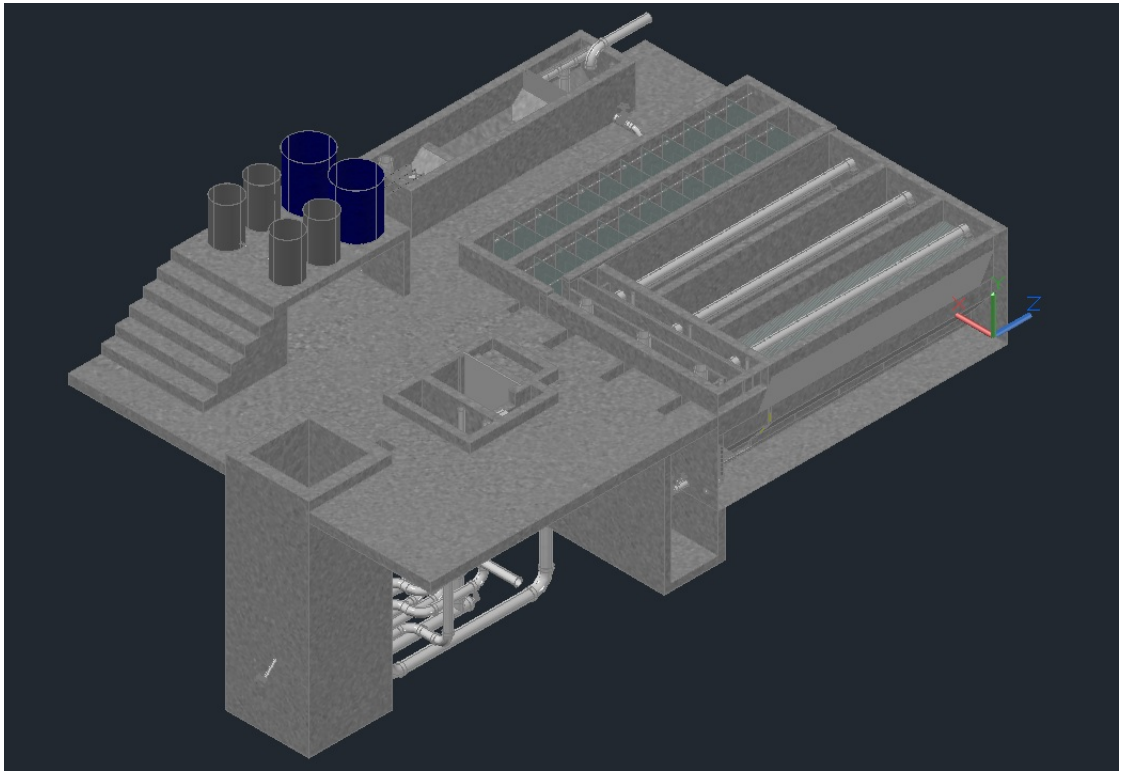


Figure 2: Plant Drawing after Materialized

The aim of the project was to produce AguaClara design drawings with all the materials rendered from our design server, so that our clients can obtain a realistic plant drawing within the AutoCAD file. The problem encountered was that the command code generated from the Mathcad file failed to apply the materials to our actual drawings generated from our sever. While the Mathcad code was error-free, several other errors occurred. The first one was that the MaterialsAC file includes materials that are not included in the default Autodesk Materials Library. Another error was that the listed materials used in our drawing code was missing in the “Document Materials” within the drawing, separated from the Autodesk Materials Library. Every material the code specifies to render has to be found within the “Document Materials” in order to be used.

Note that after rendering the materials, sometimes the materials may not appear in the “xray shademode” of AutoCAD, and has to be changed to “realistic shademode” instead.

Design Details

The MaterialsAC code is only considered as an add-in code in the main design codes since the code only adds more information to the drawings rather than affecting how each part or layer will be drawn within AutoCAD. The materials still however provide much visual information about the texture and color of each part of our plant compared to the current conceptual design. Clients can have a more realistic picture of how their constructed plants will look.

Adding Materials to the Document Materials Library

In order to access to any materials from the Autodesk Material Library, it first has to be added to the “Document Materials” of the drawing file. Accessing the “Material Browser” through command code “**RMAT**” or “**MAT-BROWSEROPEN**” (3), you will see the “Autodesk Library” on the window, with all the materials listed on the right side of the window. The top box is the “Document Materials”, which is default to have only the “Global” material in it. To add the material to the “Document Materials”, simply click on the material icon you want to add and it will appear in the “Document Materials” box immediately. You can also search for the materials you want via the search box on top right. Currently there is no known command that automatically adds the materials to the “Document Materials”.

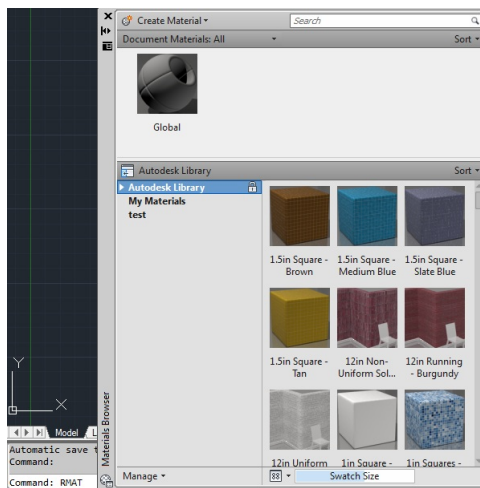


Figure 3: AutoCAD Material Browser

You may also create your own material via the “Create Materials” command box on the top left, yet this function may be more applicable to more specific designs other than our AguaClara plant designs. The newly created materials will be saved in “My Materials” folder within the computer.

Render Materials Command

After adding all the required materials into the “Document Materials”, we need to type in the command lines that will render the materials into different specific layers. An example code is shown as follows:

```
-layer  
  
material  
  
Flat - Polished Gray  
  
*con
```

The first two commands “-layer” and “material” are the default command for materials rendering. The third line “Flat - Polished Gray” indicates the material you choose to apply. The material has to exist in “Document Materials” or else AutoCAD will fail to locate it, making the command useless. The fourth and final line “*con” indicates the layer(s) to which you want to apply the materials. The “*” will make AutoCAD to search all layers that end with “con”. Similarly, “*plu” indicates all pipe layers which end with “plu”. The list of commands for rendering materials into the AguaClara EtFlocSedFi drawing is posted on the Design page Wiki as a text file.

Creating Materials Template

Since the addition of materials has to be done manually, the AguaClara server cannot produce designs with rendered materials in it. One possible solution is to produce an AutoCAD drawing template with the necessary materials preloaded in the “Document Materials”. Any new AutoCAD drawings opened from the template will inherit all the settings within the template, thus allowing the user to access to the needed materials immediately, saving the effort of adding the materials manually. This method has been tested on several computers in Carpenter Hall and AguaClara lab, but it does not work when the template is applied on the AguaClara server.

To create a new AutoCAD template, simply save the drawing file with all the settings and drawings you wish to include as a .dwt file. In this case, the template is an empty drawing file with the required materials already added in the “Document Materials”.

Problems Encountered

Materials Not Found within Autodesk Material Library (fixed)

In our previous MaterialAC Mathcad code, the materials listed are:

“Flat - Polished Gray”	“PVC - White”	“Machined 02”
“Smooth - Burnt Red”	“Smooth - Ivory”	“Anodized - Gray Textured”
“High Gloss - Burnt Red”	“Brushed”	“Textured - Royal Blue Matte”
“Smooth - Black”	“Transparent - Teal”	“Transparent - White”

Among the 12 materials, “Transparent - Teal” and “Transparent - White” are materials created by previous AguaClara designers, and are not found within the default Autodesk Material Library. Thus, users cannot replicate the materials rendering with versions of AutoCAD on other computers unless they obtain the information or file of the self-created materials. While the two materials are listed in the “Document Materials” of our MaterialsInsert.dwg AutoCAD template, errors may still occur when the material library does not have the original file of the new materials.

Materials not Imported in AutoCAD on the Server (not fixed)

MAJOR ISSUE!!!

Our closest attempt was creating our AguaClara design based on a .dwt template with all the materials included. Aforementioned, the method works for most computers except on the server. Our first solution was to include a Lab-View code within the server that commands the AutoCAD designs to be drawn from AguaClara0.dwt (if the design request is in English) or AguaClara1.dwt (if Spanish). Both templates have been modified to include all the materials that our MathCad code indicates to apply. A backup plan was in place as well. Before applying the AutoCAD command to render materials, we included an additional command line “insert <https://confluence.cornell.edu/download/attachments/173604905/MaterialsInsert.dwg>” that would make AutoCAD insert another template “MaterialsInsert.dwg” that should add all the required materials into “Document Materials”. In our test runs on the server, both templates were successfully imported, but for unidentified

reason(s), the “Document Materials” file was still empty. Note that both methods could successfully import the materials into “Document Materials” when we tested it manually on other computers. For this reason we have to conclude that the automated materials rendering process is unsuccessful and has hit the bottleneck.

Accomplishments

Replacing the Two User-created Materials with Materials that Exist in the Autodesk Material Library

“Transparent - Teal” and “Transparent - White” were replaced by “Tinted - Blue-Green” and “Clear - White” respectively so as to avoid the possible error that the materials may not be found within the AutoCAD Material Library. Adjustments had been made in AguaClara0.dwt, AguaClara1.dwt and MaterialsInsert.dwg templates and “MaterialAC” Mathcad code accordingly. The new list of materials is as follows:

“Flat - Polished Gray”	“PVC - White”	“Machined 02”
“Smooth - Burnt Red”	“Smooth - Ivory”	“Anodized - Gray Textured”
“High Gloss - Burnt Red”	“Brushed”	“Textured - Royal Blue Matte”
“Smooth - Black”	“Tinted - Blue-Green”	“Clear - White”

Updating AguaClara0.dwt , AguaClara1.dwt and MaterialsInsert.dwg Templates

Created by previous AguaClara designers, the AguaClara0.dwt and AguaClara1.dwt are the two major templates we use to create our AguaClara designs. MaterialsInsert.dwg is an empty drawing template that contains all the necessary materials in its “Document Materials” file. The three templates had been updated with the most current list of materials within their respective “Document Materials” file.

Manual Material Library File

Although not automatic, one can create a Material Library folder that contains all the materials listed in our AguaClara designs. The file created will be in .adsklib format. Clients can import the library in their own version of AutoCAD, and add the materials manually into the drawing “Document Materials” before reproducing the design from the Mathcad code. Note that the materials will not be automatically added to the “Document Materials” - this process has to

be done manually. While this allows the clients to render the materials into the design, the process is still manual and complicated, which is not preferred from our perspective.

Creating material library

Step 1: Open Material Browser, click “Manage” > “Create New Library” (4)

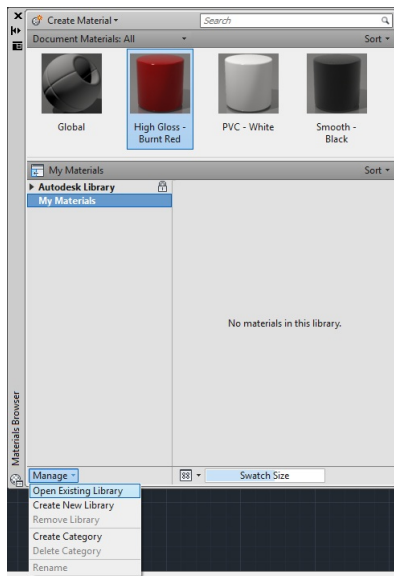


Figure 4: Creating New Material Library

Step 2: Name and Save Library (data file in .adsklib format) (5)

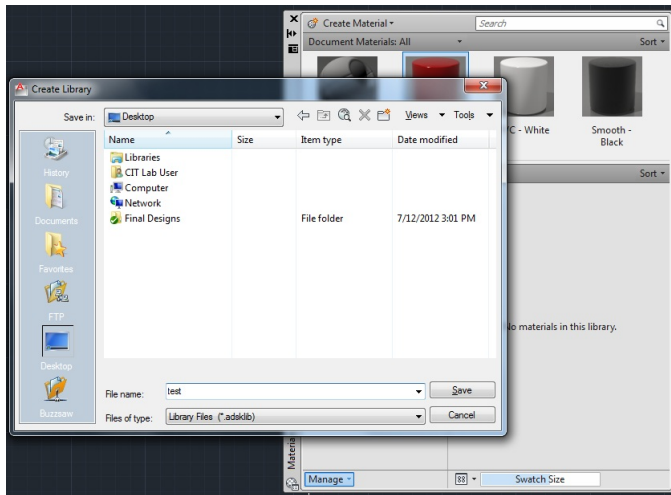


Figure 5: Saving the Library

Step 3: Drag (or Copy) Desired Materials into Material Box on the Right (save is automatic) (6)

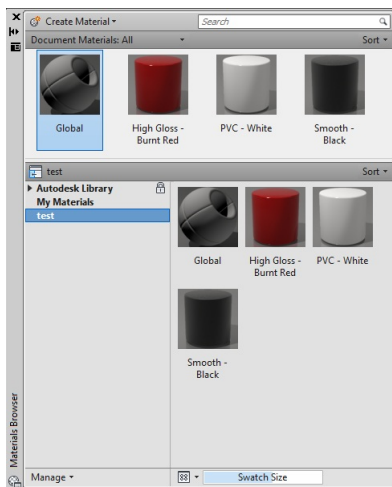


Figure 6: Adding Materials into Your Material Library

Import Library and Materials into “Document Materials”

Step 1: Open Material Browsers, click “Manage” > “Open Existing Library”, Choose File0 (7)

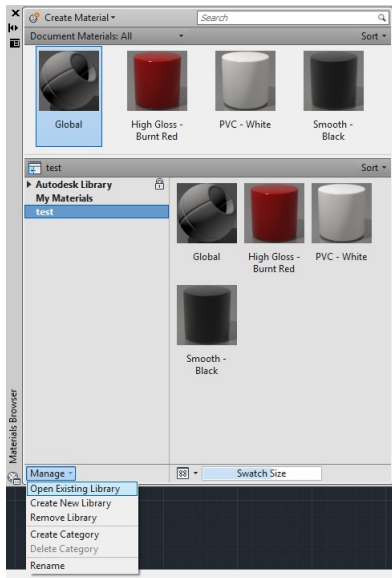


Figure 7: Importing Materials from Existing Library

Step 2: Click on the Materials in the Material Box to Add Them into “Document Materials”