How to make your own voxel file

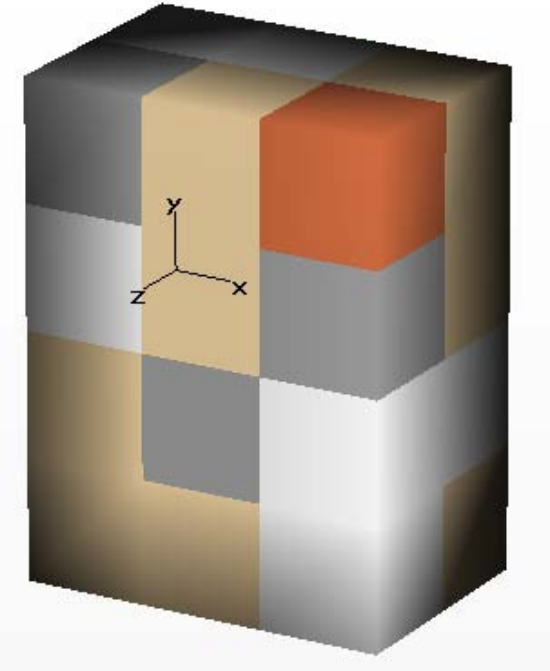
CST 2013

Which files are needed?

The following files are needed in order to create a voxel model.
The files can be saved anywhere.

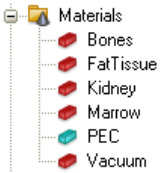
1. .vox file (ascii)
2. Material .txt file (ascii)
3. Material Property .txt or .lat file (ascii or binary)
4. .bmp files (optional)

We will investigate this by building our own voxel model



Goal:

- To build a voxel file consisting of 3x2x4 voxels
- Model contains 4 dielectric materials (excluding vacuum)



Step 1: Create the Material file

MSMaterial.txt - Notepad

File Edit Format View Help

```
### Version 2009 ###
// Tissue                Num     Eps             Mue     Kappa           Rho         K       HeatCap         BloodFlow       MetabolicRate
//                                                       [s/m]           [kg/m^3]    [W/mK]  [kJ/K/kg]       [W/K/m^3]       [W/m^3]
//
Marrow                   1       6.487770        1.0     0.022727        1030        0.624   2.7             32000           5700
FatTissue                2       6.073879        1.0     0.036292        1100        0.201   2.5             1700            300
Bones                    3      15.282458        1.0     0.064312        1850        0.410   1.3             3400            610
Air                     16       1.000000        1.0     0.000000        1.3         0.025   1.005           0               0
Kidney                  19      98.098824        1.0     0.810724        1020        0.499   3.9             270000          48000
```

Each material has to be assigned an integer number smaller than 256

Step 2: Create the Material property file

The material property file can be either binary or ascii and is built up as a long row of integer material property values.

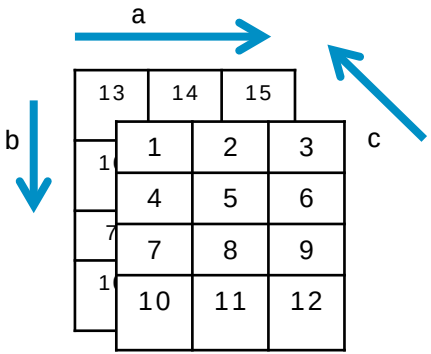
The final voxel model contains 3x2x4 voxels, and we therefore need at least 24 values in this file.

Construct the model as a text file, and then later convert it to binary (if preferred)

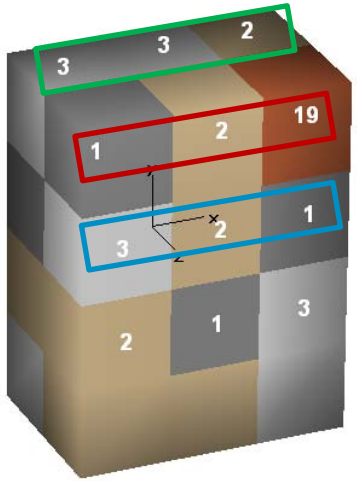
Note that binary files are recommended for larger models

Step 2. (Cont) Create the material property file (either ascii format - .txt, or binary format - .lat)

- The numbering system starts at the front, top, left (pos 1)
- It fills up the top row in direction „a“
- Then in direction „b“
- Then in direction „c“



Example: Assign each voxel a material property value (as defined in the material file). The assigning of the values have to be in the order shown to the far left. The picture to the right show the resultant voxel file for the material assignment shown in the file rawDetails.txt. The blocks are color coded for easy comparison.



Step 2 (optional) Convert the .txt file to a binary format

If the file is converted to binary, it should have the extension „.lat“

Step 3: Create the .vox File (I)

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Voxel Data Info File

The voxel data info file links several files and forms one voxel data set. It has the extension '.vox'.

The info file contains links to material description files and voxel data files. A voxel data file simply stores the material numbers for each individual voxel. The material definitions for these material numbers are found in the material description files.

The voxel data info file is composed of several sections. Each section starts with a keyword in square brackets. Lines beginning with two slashes can be used to insert remarks as they are ignored by the interpreter.

The existing keywords are the following:

[Version]

The number of the version for this voxel data info file.

[Material]

This section consists of a two column list providing the material files at the appropriate frequency [MHz].

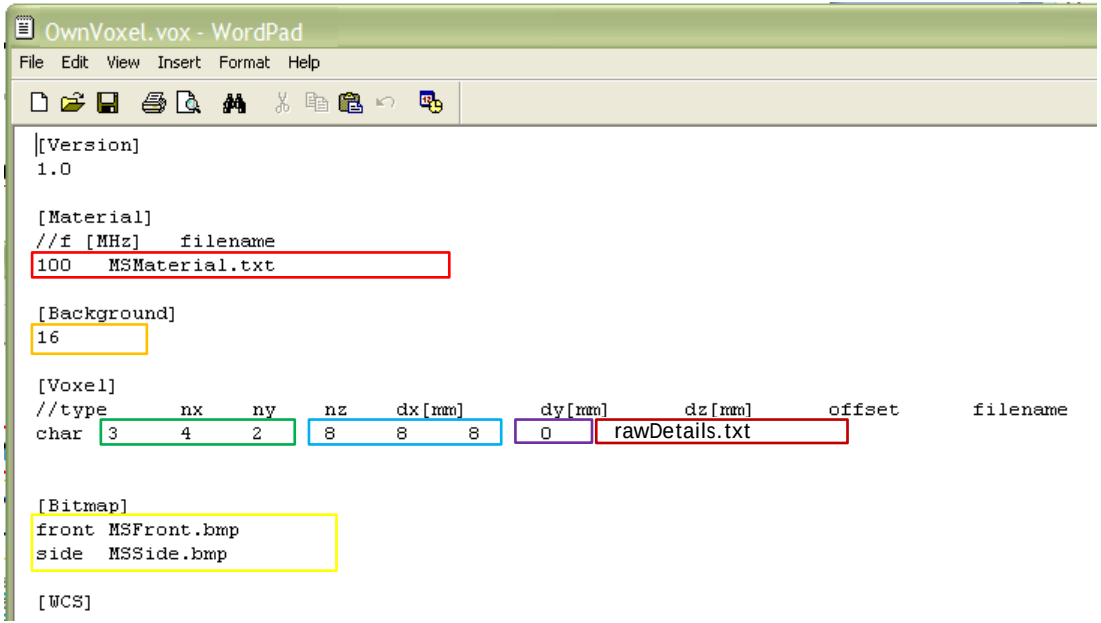
Example:

```
//f [MHz]    filename
100          Material_0100.txt
450          Material_0450.txt
```

This rest of the file explanation can be found in the online help

Step 3 (Cont) .vox file (II)

Below is an example .vox file. Note the important settings:



Name of material data file and the frequency of the data

Number of the background material (needs to be defined in material txt file)

Nr of voxels in X,Y,Z directions

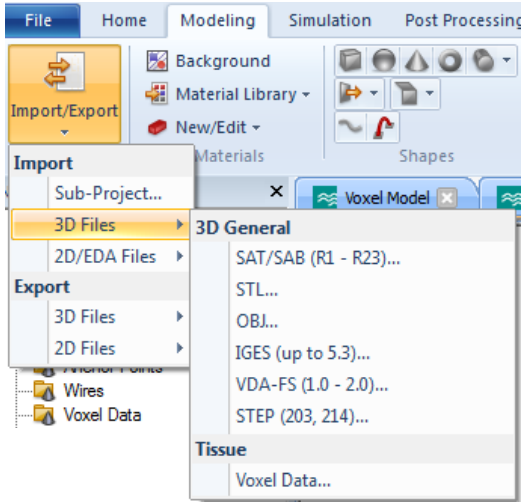
Size of individual voxels in X,Y,Z

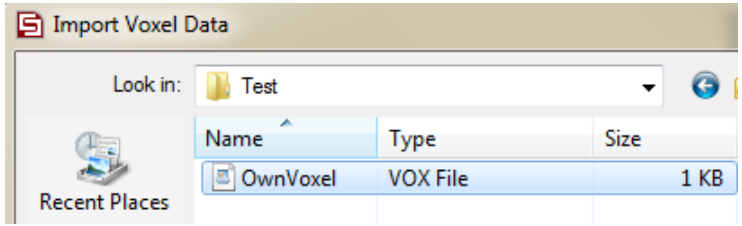
Offset = zero, unless the .lat file has a header

The material property file name (either.txt or .lat)

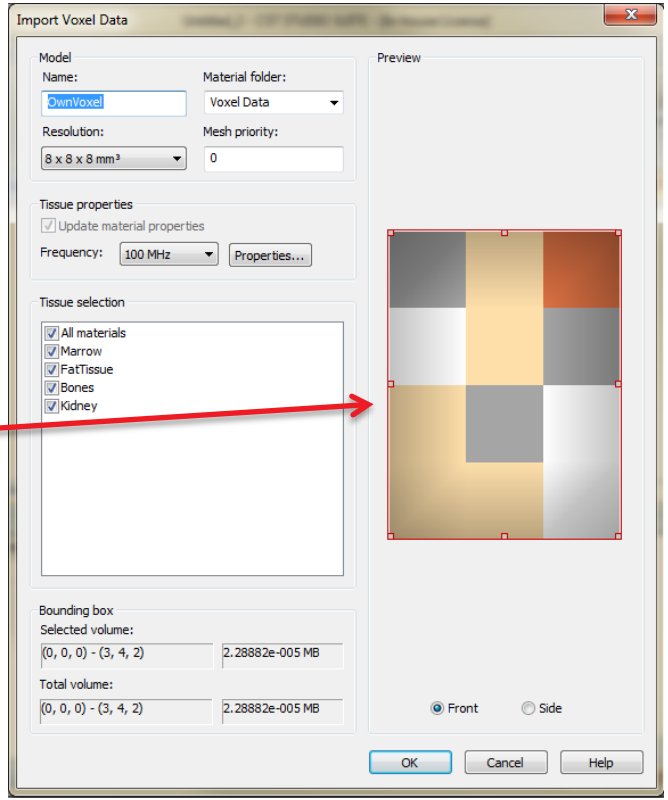
Images that will be used to show the model upon Import

Test the import

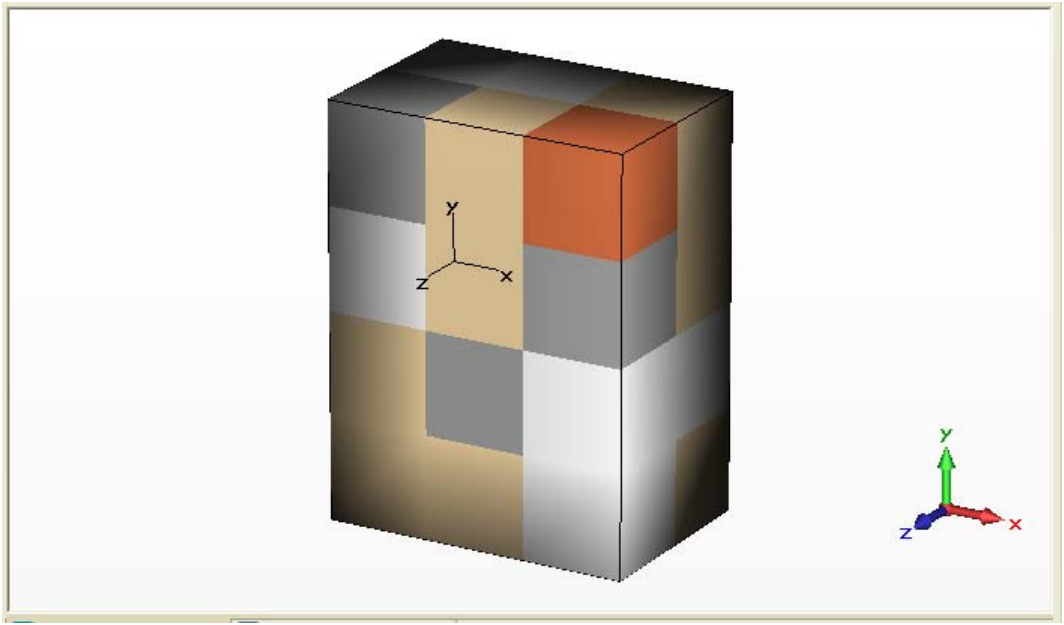




Pull box larger to include the whole voxel model



Completed Voxel Model



Note:

By default, only about 1/3rd of the model will be imported, unless you pull the box on slide 10 larger. This can be manually adjusted in the history list, by using the .with HumanModel command and setting the z component of the volume to 1