Professional Software Development

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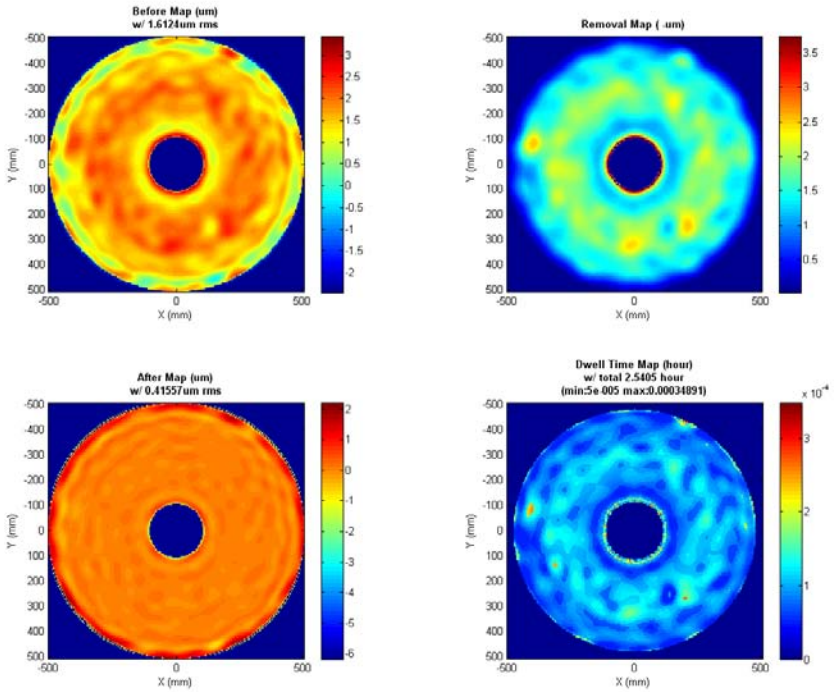
What is a software?

A computer code package to achieve a given task.

e.g. MATRIX, A software to optimize a polishing process for a given target removal map



What is a good software?

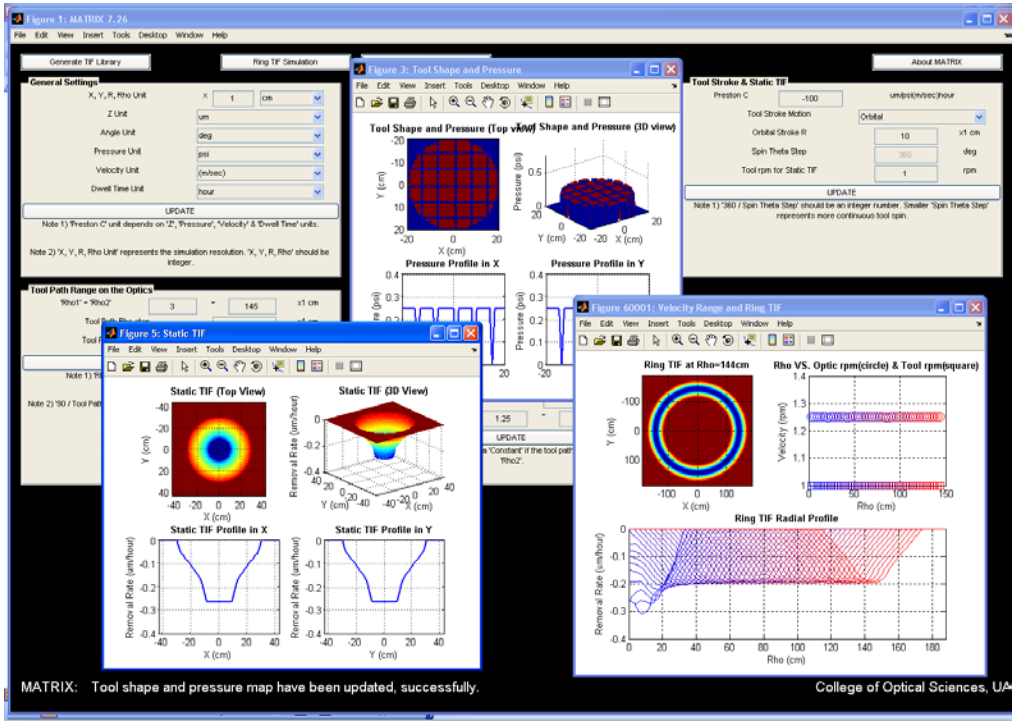
1. High performance
2. User friendly interface
3. Well documented manual
4. Upgrade as needed
5. Doable maintenance by someone else
6. Version control

These all depend on specific goal and purpose of your software.

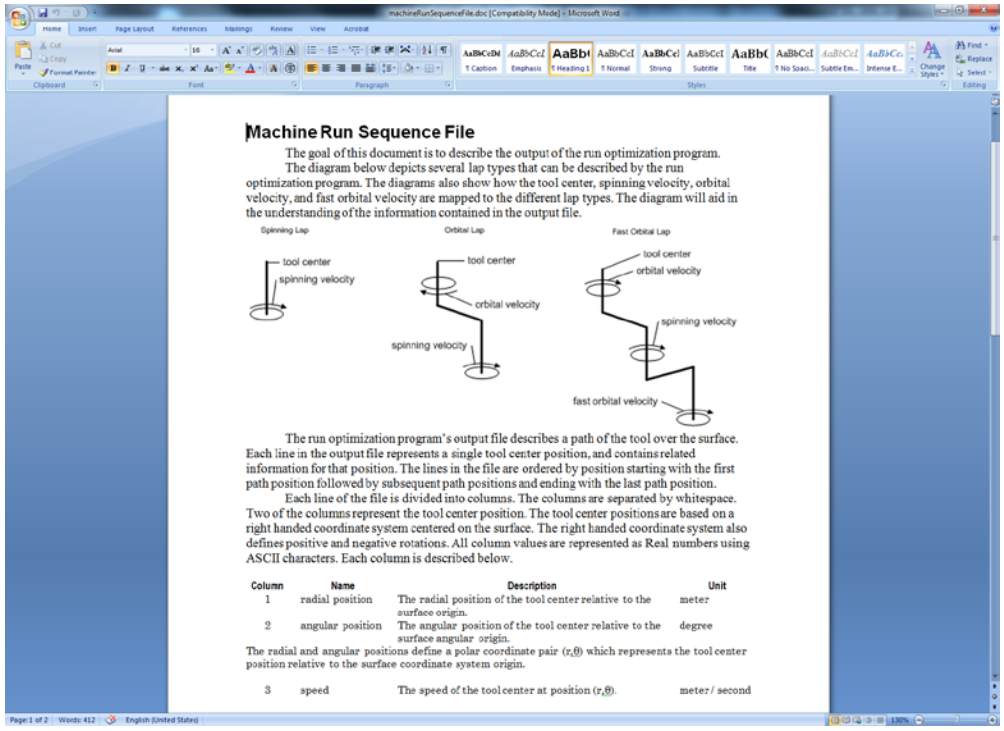
Specify the goal of your software clearly before you start a single line in your code.

1. High Performance
 - You are already good at this as a graduate student at OpSci.

2. User Interface
 - GUI or TUI will be good.
 - Editing in code is not a good way.
 - If there are any figures or graphs, put titles, labels & units.



3. Well documented manual
 - Developer's manual
 - User manual
 - Overall structure diagram
 - Version control document
 - Support documents (e.g. Machine Run Sequence file format document)



Machine Run Sequence File

The goal of this document is to describe the output of the run optimization program.

The diagram below depicts several lap types that can be described by the run optimization program. The diagrams also show how the tool center, spinning velocity, orbital velocity, and fast orbital velocity are mapped to the different lap types. The diagram will aid in the understanding of the information contained in the output file.

Spinning Lap

Orbital Lap

Fast Orbital Lap

The run optimization program's output file describes a path of the tool over the surface. Each line in the output file represents a single tool center position, and contains related information for that position. The lines in the file are ordered by position starting with the first path position followed by subsequent path positions and ending with the last path position.

Each line of the file is divided into columns. The columns are separated by whitespace. Two of the columns represent the tool center position. The tool center positions are based on a right handed coordinate system centered on the surface. The right handed coordinate system also defines positive and negative rotations. All column values are represented as Real numbers using ASCII characters. Each column is described below.

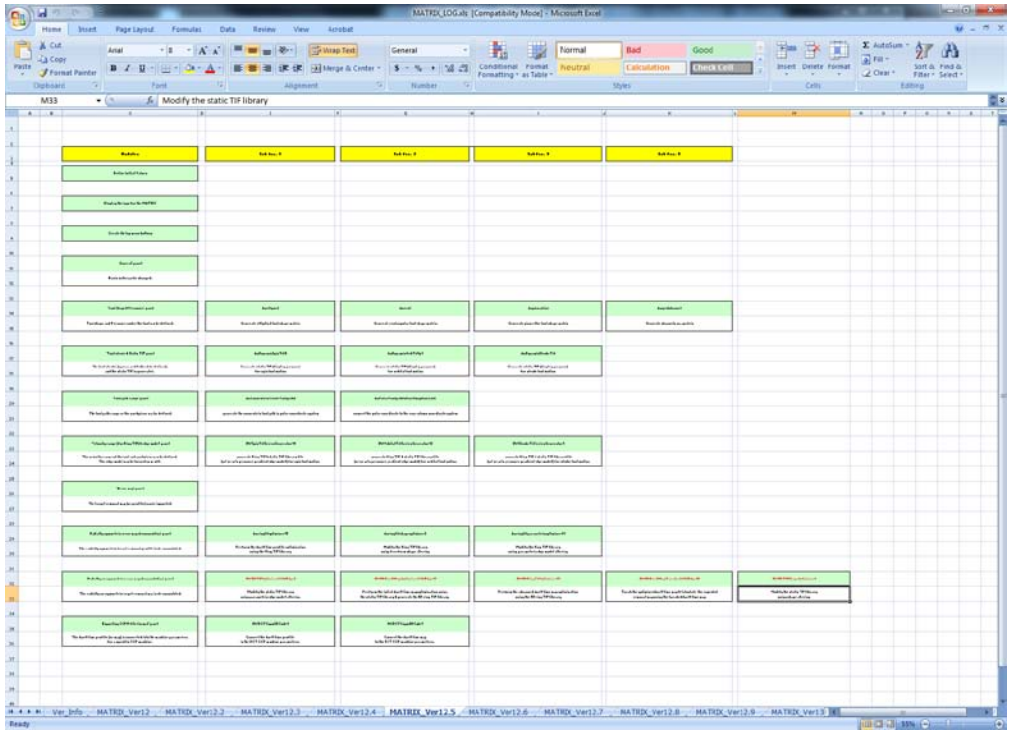
Column	Name	Description	Unit
1	radial position	The radial position of the tool center relative to the surface origin.	meter
2	angular position	The angular position of the tool center relative to the surface angular origin.	degree

The radial and angular positions define a polar coordinate pair (r,θ) which represents the tool center position relative to the surface coordinate system origin.

3	speed	The speed of the tool center at position (r,θ).	meter / second

4. Upgrade as needed

- Modulized code (e.g. sub-functions)
- Clearly defined inputs and outputs (e.g. radius of a circle in pixels -> square matrix)
- Clearly defined task (e.g. generate a circle with 1s in a matrix with 0s background)



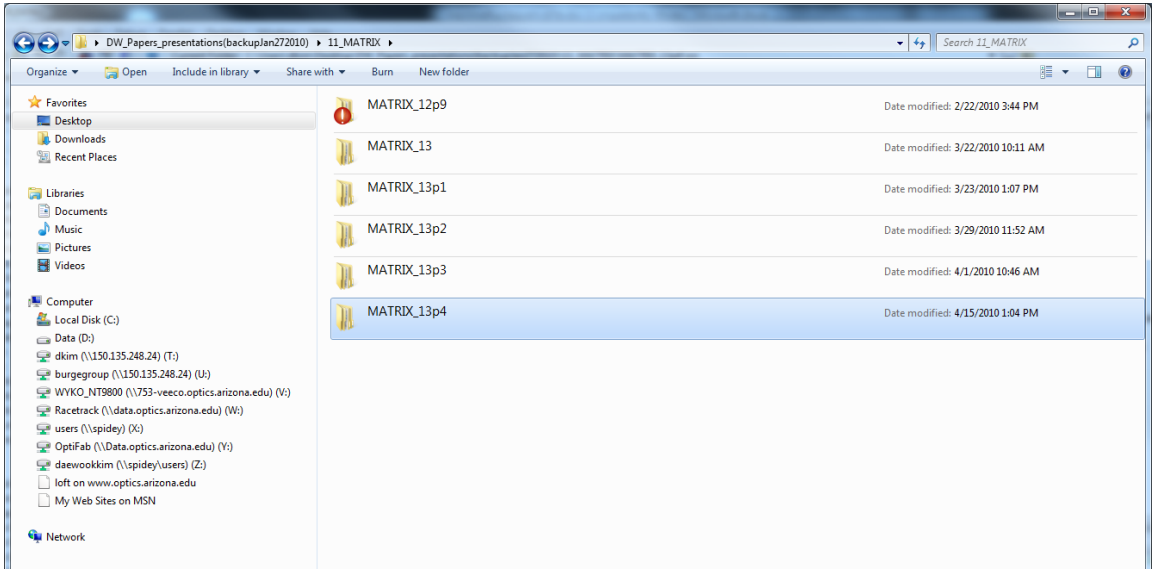
5. Doable maintenance by someone else

- Well documented manuals (e.g. Overall structure diagram)
- Header file for each module (i.e. sub-function)
- Comments in the code (few different levels)

```
%% General
%This function creates a circle.
%The circle values are 1. The background is 0.
%2010 Apr. 26 : Newly created

%% Input
%Circle_radi: Radius of circle (in pixel)

%% Output
%Circle_map: Circle (w/ 1) in the background (w/ 0) square matrix

%% Code
 function Circle_map=DWCircle(Circle_radi)
%% Generate a large filled circle
Larger_map=DWCyl(Circle_radi);                    %DWCyl function creates a filled circle matrix
Temp_map=Larger_map*0;
%% Generate a small filled circle
Smaller_map=DWCyl(Circle_radi-1);
Temp_size=size(Temp_map,1);
Temp_map(2:Temp_size-1,2:Temp_size-1)=Smaller_map;
%% Subtract the small filled circle from the large filled circle
Circle_map=Larger_map-Temp_map;
```

6. Version control

- Make a back-up (the code and documents) for a released version of your software (w/ version control software, different folder names in your computer)
- Version control document



Thank you.