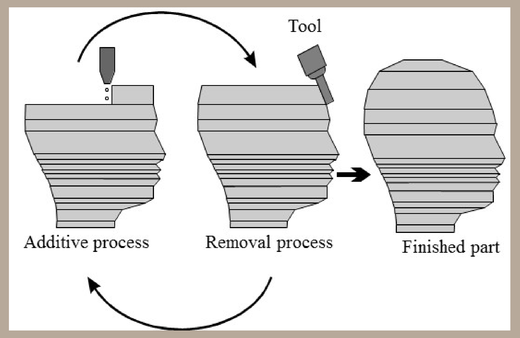
Oregon State School of Engineering – Computer Science

HYBRID MANUFACTURING G-CODE EDITOR

Connor Wilson, Dr. Karl Haapala, Sriram Manoharan, Dustin Harper



Overview

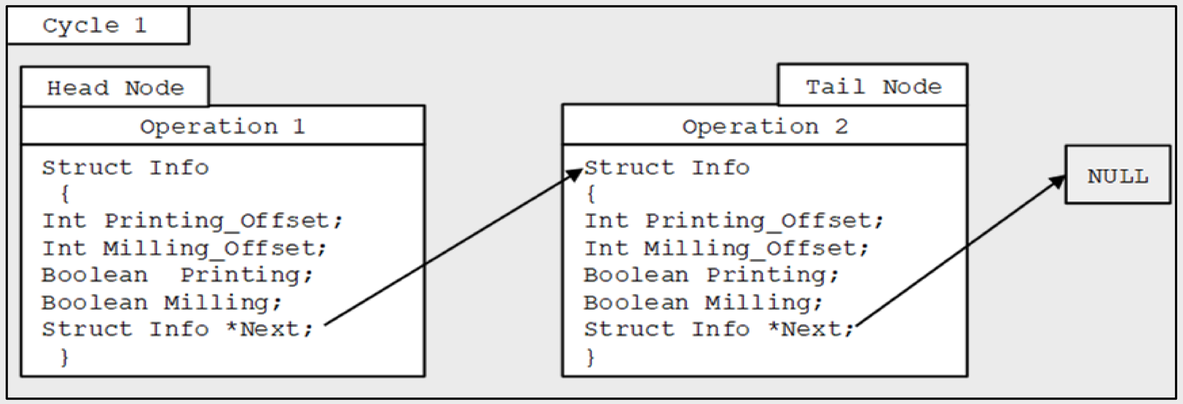
- The G-Code editor software facilitates the integration of additive and subtractive manufacturing processes to enable hybrid manufacturing.
- Perform 3D printing as well as computer-controlled milling in a sustainable manner.
- We have input data to dictate how we want the machine to behave. The G-code generators differ for controlling each process, making it tedious to input all the information manually.
- All calculations can be done on one machine, reducing the risk of making an error when transferring the parts in between machines. Using inputs from the user, the software will be able to generate one comprehensive code.

Future Work

- Continue testing G-Code editor through unit testing and creating parts
- Add more graphics and features to Graphical User Interface to improve user experience
- Use data from prints and Artificial Intelligence to determine when prints will fail or succeed based off inputted values.

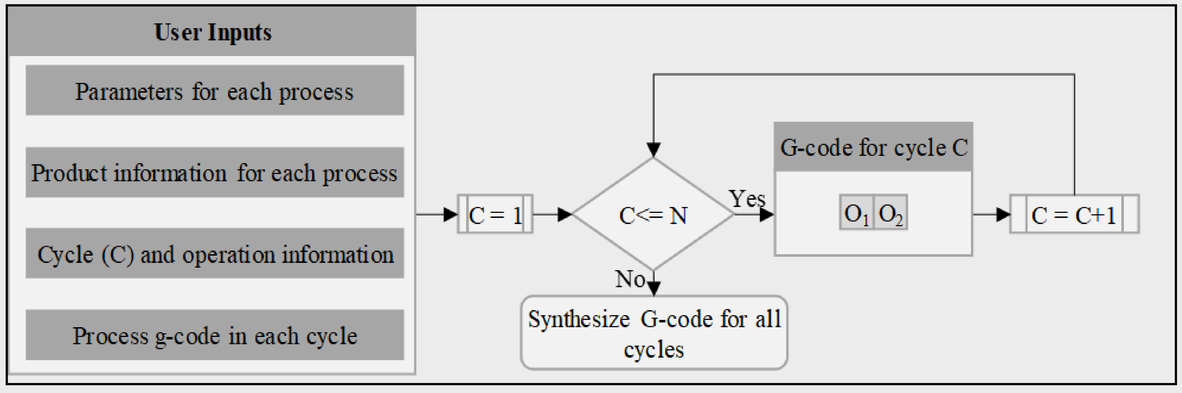
Acknowledgment
We gratefully acknowledge the support of the U.S. Department of Energy and the OSU Energy Efficiency Center for their support of this research through the Industrial Assessment Center program.

Oregon State University



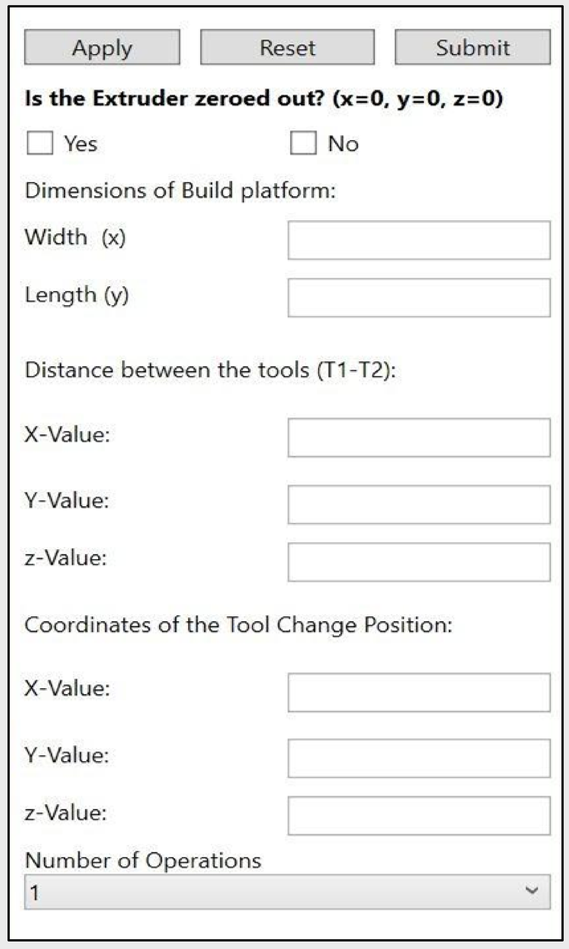
Linked List Data Structure

- Each node in the linked list holds the offset values for each process, a boolean for each process (true or false) indicating whether that process is occurring, and a pointer to the next node in the list.
- The nodes are allocated dynamically because the size of the linked list isn't known at runtime, thus it must be generated while the program is executing.
- The list has a FIFO (First in First Out) system where it acts as a Queue. The first value to enter the linked list is the first value to leave. The runtime for adding nodes to the list is O(1), the fastest runtime possible, meaning it will be the same no matter the size of the current linked list.



Logic Flow of G-code Editor

- Processes information about the machine and product
- Program then enters a loop where specific information for each cycle is submitted
- Once all process parameters have been received the G-code is produced



Graphical User Interface

- Created a Visual Studios WPF form where users can submit their part and machine information
- Form adapts as user makes changes to inputs. User is prompted for specific inputs based off their previous responses in the form.
- All information displayed in a easy, user friendly manner
- All inputs are validated that they will be compatible with the machine before the comprehensive G-Code is created.