IPRO 304
Developing a visual Heat Treatment Program for Finkl & Sons

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1.0 Revised Objectives

The purpose of IPRO 304 is to create a software package to assist A. Finkl & Sons in tracking of parts in heat treatment furnaces. The objective for Spring 2008 is to reconstruct and improve the furnace loading software developed by IPRO 304 (Fall 2007) resulting in a program with the following attributes:

- Increased ease of use via:
  - Compatibility with popular CAD packages (i.e. ProE or UGS)
  - Solid Modeling
- Software capabilities:
  - Shape display in virtual furnace
  - Movement of shapes around the furnace
  - Resizing of shapes within furnace to match actual part specifications
  - Save and load configurations of specific furnace setups
- Test the software with sample database
- Robust development for future modifications including:
  - A complete and easily updated database of all Finkl part shapes
  - Part tracking/history for quality control
  - There have been no major changes in objectives of the heat treatment group.

2.0 Results to Date

The software created by the previous IPRO has been fully analyzed to determine the feasibility of continued development. After our analysis, we determined that the previous software was missing vital code that would be used to build the required features. A cost-benefit analysis showed that we would be more productive if we reprogrammed the application from scratch rather than trying to implement the missing code in the existing project. Starting from scratch also allowed us to remove a third-party development library from our project, which reduces the number of software licenses that our sponsor will have to purchase.

Since restarting, we have been able to make progress beyond last semester and implement a number of new features, including: viewing multiple parts, moving, resizing, scaling, annotating parts, and saving the changes made to the virtual furnace.

We have had several meetings with Finkl which provided us with information about how they will be using the finished software, and how they would like to integrate it with their current packages. We also discussed what we have already incorporated into our application, and received positive feedback from the appropriate department heads at Finkl. There is one major feature that still needs to be implemented before the application is thoroughly tested and previous features are refined to Finkl's requests. This feature will allow Finkl's production database to pass data to our application.

The features that have already been implemented will be used as building blocks for the features that have yet to be implemented. The application is coded using a staged release process. When a new feature has been programmed it will be tested and then compiled into an executable that can be used to demonstrate the accomplished work.

Completed and future features will be combined into the final executable to provide Finkl with the application that they desire and requested.

3.0 Revised Task/Event Schedule

The IPRO team has decided to dived the program development into thirds. The first third of the project is implementing the basic shape functions. This includes being able to view multiple parts, moving the parts, and resizing the parts. The second third of the program is implementing the more complex methods. This includes being able to view two of the same parts, collision detection (knowing when two or more parts are in contact with one another) and building/displaying the furnace. The last and final stage of the program is to integrate it with A. Finkl & Sons database. This means importing parts and their specific information into our program and then once the heat treatment process is over, being able to export the information, either being able to print it or save it. Bryan and Joe are working on the programming process while both Nick and Nikolay are modeling A. Finkl & Sons parts in Pro-E. The timeline has changed due to the loss of one team member. The group was off to a slow start, but after a week of reviewing old code and brainstorming new methods of implementation, the group is now back on track.

Revised Schedule

week	dates	Tasks
1	1/22 – 1/25	Intro to IPRO
2	1/28 – 2/1	Review previous semester's work
3	2/4 – 2/8	Meeting with Finkl to get our expected work
4	2/11 – 2/15	Begin working on project plan, meeting with Dr. Hu, continue looking at previous semester's program and code, basic shape functions
5	2/18 – 2/22	Final project plan is due, basic shape functions
6	2/25 – 2/29	Basic shape functions
7	3/3 – 3/7	Basic shape functions
8	3/10 – 3/14	Status meeting with Finkl, midterm report, complex shape functions
9	3/17 – 3/21	Spring break, prepare for midterm presentation (slides, compiling current program, etc.), complex shape functions
10	3/24 – 3/28	Midterm presentation with Finkl, complex shape functions
11	3/31 – 4/4	Integrating with Finkl database
12	4/7 – 4/11	Integrating with Finkl database
13	4/14 – 4/18	Integrating with Finkl database
14	4/21 – 4/25	Prepare for Ipro day (posters, presentation, etc.)
15	4/28 – 5/2	IPRO day presentations
16	5/5 – 5/9	Final report
17	5/9 – 5/13	Debriefing meetings with Finkl

4.0 Changes in Task Assigments and Designation of Roles and Team Organization

Individual Assignments

Name	Major	Individual Role
Bryan Murillo	Electrical Engineering	Programming
Joseph Pawlak	Computer Science	Team Leader/Programming
Nikolay Popov	Mechanical Engineering	3D Modeling
Nicholas Przybysz	Mechanical Engineering	3D Modeling

The change in individual roles of out team is due to the fact that our previous team leader dropped the IPRO course. Joseph Pawlak took his position as the new team leader, since he is the most knowledgeable of the team member in programming. The rest of the roles stayed the same.

There are two sub-teams. First sub-team consists of Joseph Pawlak and Bryan Murillo and it deals with programming aspect of the project. The team is responsible for writing the code for the needed functions of the program and implementing them and creating the interface of the heat treatment software. The second sub-team consists of Nikolay Popov and Nicholas Przybysz and it deals with modeling the 3D shapes that are going to be read by the software. The team has to complete the 3d models of all possible shapes that can be inputted in the furnace based on Finkl's shape codes Also the team has to create any additional models and tables with models specifications, that the software needs to be inputted.

5.0 Barriers and Obstacles

As with any project there are a number of obstacles that arise, how the group handles those obstacles will determine if the project is successful or not. One of the biggest obstacles in our group is getting all of the members together for meetings at Finkl. Because the group consists of members from different majors, the schedules for team members do not always match up, which makes coordinating meetings difficult. Another obstacle is that this project is mainly Computer Science oriented. We currently only have one CS major which places all of the pressure of developing the program on that one person.

In order to resole the issue of getting team members together, we have compiled a master schedule to find the times that best suit each member for meeting together. Because we have to travel to Finkl for meetings with company representatives, there is numerous planning and emails that must be sent to set a meeting. To deal with the fact that our group only has one CS major and an ECE major, those in the group that are Mechanical engineers are learning as much as they can about the way the program is structured and functions. The group also has the option to bring in outside help to work on the programming aspect of the project.

Problems that may arise in the future will be based on the implementation of the program at Finkl. There will likely be issues in reading data in from Finkl's database into the program. Other problems may arise with the people actually using the program, as they may not like some aspects of it, since it a big change in their current methods.

To work on correcting these problems we are going to do some sample integrating with a copy of Finkl's database that we will be receiving shortly. This should ensure a seamless integration when the program is brought to Finkl. There will be a software demonstration to the foreman that will be using the program to gather feedback form them on what could be changed in the program to better suit their needs.