

I PRO 339

Piston and Piston Pin Manufacturing Process Improvement

Project Sponsor: **Burgess-Norton Manufacturing Company**

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Abstract

The team of IPRO 339's main objective is to assist Burgess-Norton Manufacturing Company with eliminating a persisting problem that has been affecting the company for many years.

Burgess-Norton Manufacturing Company is the world's largest manufacturer of piston pins, as well as the leading producer of powder metal parts. Supplying many major car companies across the world, Burgess-Norton thrives on maintaining a high standard of quality in both their products and services.

Recently there has been a change in the automobile industry that has affected the way piston pins are manufactured. These changes have brought on difficulties for the company as they must now change their product specs and adapt to the evolving market. Their main problem is the existence of nicks on the piston pins. The main goal of this IPRO team is to find a way to eliminate these nicks that occur throughout the company's manufacturing process.

This document will outline the main objectives and tasks that the team has been assigned with. Team structures, time lines and other plans are included. Also, a further company history and description of Burgess-Norton will be provided in order to make the objectives more clear.

TEAM CHARTER

Roster

Name	Email	Phone
Akhambay, Assyl	assyl_akhambay@mail.ru	N/A
Barrera, Edilberto	edilbertoba@gmail.com	
Binder, Dylan	dbinder1@iit.edu	
Douh, Wahib	wdouh@iit.edu	
Heo, Yun Seon	yheo1@iit.edu	
King, Terrance	tking2@iit.edu	
Ko, Hyunseok	thardaway1@gmail.com	
Kolesnikov, Andrey	andreyk03@gmail.com	
Simen, Sandrine	simenpeace@gmail.com	
Perle, Collin	cperle@iit.edu	
Truong, Guy	Gtruong@iit.edu	
Ustupski, Krystian	kusupsk@iit.edu	

Team member strengths, needs and expectations

Assyl Akhambay is a fourth year Aerospace Engineering major. He looks forward to make a contribution to solve Burgess-Norton issue. He wants to improve his teamwork, and communication skills by the end of semester.

Edilberto Barrera is a third year Civil Engineering student with a good work ethic and a willingness to learn. Hoping to improve team work and communication skills, he looks forward to the challenge of this IPRO objective.

Dylan Binder is a fourth year Computer Science major. He is highly motivated and always ready to learn new things. He has a strong background in Mathematics, and problem solving. He is looking forward to the challenge of solving the problem at hand.

Wahib Douh is a fourth year Industrial Technology and Management, (Manufacturing Technology Specialization). Worked full-time as a Technician/electrician for a electrical drive systems manufacturer.

4 year Sales manager in auto part sales. Visited a few Automobile manufacturers worldwide. Profound knowledge about cars and car parts. Looking forward to utilize my understanding of manufacturing processes and ,how to make them more efficient, to benefit this project .

Yun Seon Heo has a Materials Science and Engineering background. She has a general knowledge of material processing and manufacturing. She hopes to improve her research, teamwork, and communication skills during this project. Overall, she hopes to see the group achieve its goal and come together as a whole.

Terrance King is a third year mechanical engineering student with hopes of furthering his understanding of the manufacturing processes employed in industry today. He looks forward to working with a reputable company like Burgess-Norton, which guarantees some worthy insight into this diverse field.

Hyunseok Ko is a senior student majoring material science and engineering. In addition to the general knowledge as a material engineer, he not only has been participating researches for three semesters but also has worked in the metal powder company for several months. He expects his metallurgical perspective to be useful source for the team to determine and solve confronted problems in this project.

Andrey Kolesnikov is a senior year mechanical engineering student. He has worked for 4 years in various engineering departments, holding full-time positions prior to this class. Spent 1.5 years working in a machining factory and gained some knowledge about screw machine processes, which he hopes will be useful in this project. Andrey wants to gain the new experience from working in a new group of people and is very interested in the “consulting” aspect of the project.

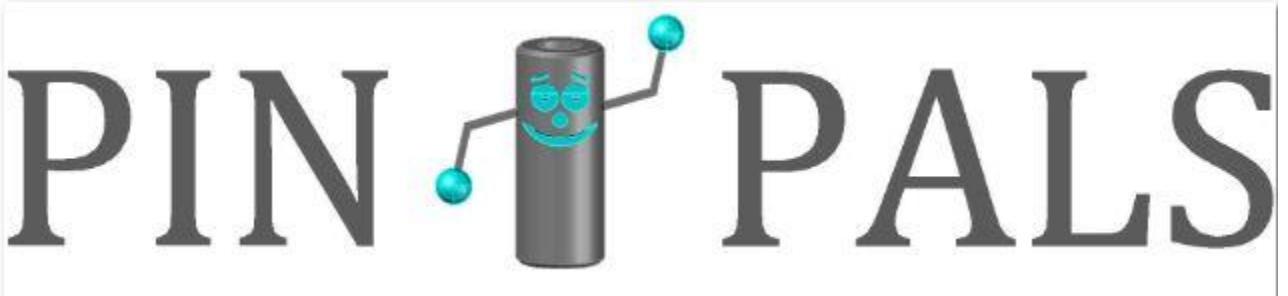
Sandrine Simen is a junior biomedical engineering student. Despite the fact she is a biomedical engineering student, she has a good background in material sciences , physics, and sciences. She hopes her knowledge and her background will help us achieve a tremendous project.

Collin Perle is a senior mechanical and aerospace engineering student. His knowledge gained as a mechanical engineering student will allow him to more thoroughly understand the piston pin making process and to have a better insight into the mechanisms which lead to failure of the part. Beyond that, he has a firm grasp on most machining processes and is experienced with various CAD programs and computer numeric control.

Guy Truong is a fourth year undergraduate civil engineering student. He has gained an adequate amount of knowledge in mathematics, physics, material properties and behavior, and is a consummate professional. He expects to gain a better understanding of the industry and wants to do everything in his power to help his IPRO team reach its objectives.

Krystian Ustupski is a third year undergraduate civil engineering student with background in physics, mathematics, materials of science as well as other engineering courses that might be useful in order to solve the given problem. He looks forward to visit Burgess-Norton, to be to see the production process , and to work together with the team to eliminate all nicks.

Team identity



The Piston Pin Perfectionists

Team Purpose and Objective

Our team's purpose is to analyze and develop strategies to prevent the occurrence of nicks on piston pins as observed in the manufacturing processes of Burgess Norton Mfg. Co.

Mission Statement: Since their inception in January of 2011, the Pin Pals have been at the forefront of piston pin nick prevention. The group's unique skill set and knack for problem solving are sure to lead to a breakthrough in the very exciting realm of flawless pin technology.

Project Objectives

- Assess the nature of piston pin nick occurrence as experienced by Burgess Norton Mfg. Co.
- Determine the rate of nick occurrence at each stage in the manufacturing process
- Develop strategies to eliminate nicks at every stage in the manufacturing process
- Implement optimal strategy at the request of Burgess Norton Mfg. Co.

Background

Burgess-Norton Manufacturing Company, has two product lines both of which produce highly engineered components serving key industrial markets. Burgess-Norton was founded in Geneva, IL in 1903, and built the core of its business on piston pins and has since then produced millions of units for all types of internal combustion engines for multiple automotive and truck customers.

The problem at hand is if a nick, scratch, or other defect is found on the pin, it will no longer meet the strict standards the piston pins have to adhere to in order to maintain proper performance and safety within a combustion engine. Burgess-Norton has over 100 plus years in the business and have utilized multiple ways to detect defects that require piston pins to be rejected. Throughout the years, piston pins have been transformed to enhance performance in piston engines. Most notably, the ends have become sharper over time causing the pin to be more likely to get nicked or dinged. Burgess Norton would like the Pin Pals to investigate defect avoidance or how to best to prevent the nicks from occurring throughout their manufacturing process.

At this stage in our project, no current well known technologies or products exist for the prevention of nicks on piston pins. It is to our understanding that this, being a recent problem in piston pins, is not well explored and is being handled exclusively by our IPRO 339 team. One of our goals with this project is to be innovative and create a means or method to prevent nicks occurrence throughout production, a result of which includes reduced failure rates and increasing client approval rating.

As far as IPRO 339 knows, this is the first attempt to address the piston pin prevention problem. In lieu of that, we hope to become pioneers in developing a fool proof method to prevent nicks on the piston pins.

Ethical issues that could arise within the investigation of the piston pin problem include: Abuse or misuse of knowledge gained from Burgess Norton on the process in manufacturing, and handling of their piston pins. Attempts to gain unsolicited information on piston pin manufacturing, from Burgess Norton without the consent of the company. Unprofessionalism that could lead to issues such as safety hazards, degradation of ones morals, and harmful insults that inhibit productivity.

Team Values Statement

Desired Behavior

Team members are expected to come to regularly scheduled meetings, accomplish assigned tasks in a timely manner, and participate in discussions at all times. If a team member disagrees with the decisions made by the team, he is expected to bring in his view in an appropriate and polite manner. Also, team members are respectful towards one another.

Conflict resolution

Problems are to be addressed using ASME and IEEE codes of ethics. Any issues that concern the team as a whole are to be brought up for discussion by the team at the next class meeting. Team members are expected to act professionally and politely.

PROJECT METHODOLOGY

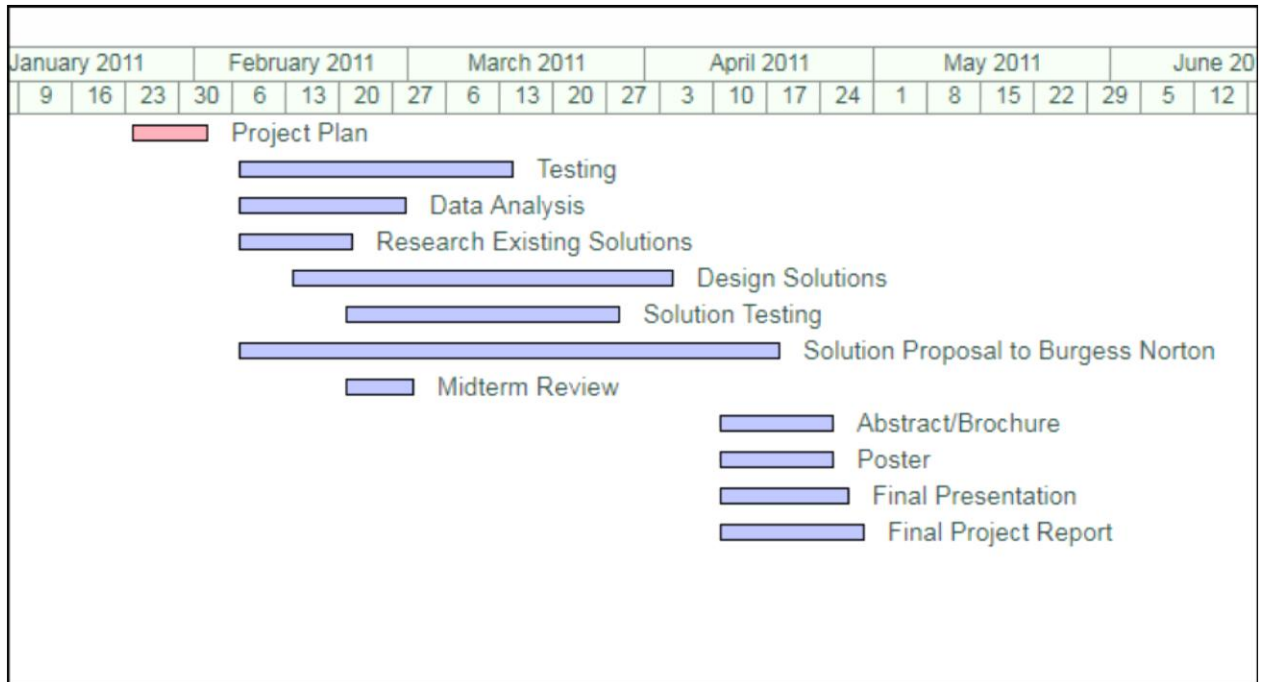
Work Breakdown Structure

Pin Pals project team will be divided into 4 sub-groups to help narrow down the scope of work for each member. Due to our requirement in reducing nicks in the piston pins manufactured by Burgess Norton and the other reduction in manual labor associated with material handling, our sub-groups will be targeting nick reduction and automation in handling and production processes. In addition to that, our team will have members committed to testing of nick origination and data analysis. Overall work flow will be organized by our project leader Collin Perle, who will ensure that the separate groups will be working together effectively and moving in the same direction in achievement of our goals.

Team Leader: Collin Perle			
Data analysis	Testing	Process Improvement	
		A	B
Dylan Binder (leader) Sandrine Simen	Guy Truong (leader) Yun Seon Heo Hyunseok Ko	Wahib Douh (leader) Edilberto Barrera Krystian Ustupski	Andrey Kolesikov (leader) Assyl Akhambay Terrance King

If it will be determined that a particular task is temporarily completed (such as testing), members of that particular sub-group will be temporarily or permanently reassigned to other groups.

Work in each process improvement sub group will be broken down into several steps to help maximize efficiency and work flow. Each process improvement team will start with observing the operations that they are dealing with and establishing possible sources for appearance of nicks or possible ways in automation of material handling. The process improvement teams will then coordinate with the testing group to ensure that the sources that are being considered actually do have potential to increase defect ratios in the production process at Burgess Norton. After the teams confirm the potential reasons for nick appearance or operations that have potential for safe automation, they will work on ideas that will reduce or eliminate risk of defect without hindering production capabilities. Finally, the testing group will test our solutions to make sure that they do help improve the process and reduce defect rates before we present our process improvement report to our customer, Burgess Norton.



Expected Results

- Expected activities will include observing and assessing the manufacturing and distribution processes Burgess Norton uses to produce piston pins. Testing will be done to determine the effectiveness of proposed solutions and also to produce guidelines for design.
- Statistical data will be provided from Burgess Norton along with pristine piston pin samples. The samples will undergo testing to determine nick causality and common points of failure.
- Potential products include material handling equipment and procedures as well as material testing apparatus and techniques.
- The analysis of data provided by Burgess Norton will provide insight into the areas of production which produce the most failures, thereby allowing the design teams to pinpoint the areas of production producing the most failed parts and thus find a solution which will eliminate the failures.

- A prototype or model of our proposed solution is expected to be produced by combining all the data and testing information into a final zero nick solution for a material delivery system.
- Challenges that are clearly before the Pin Pals as a group include ethical challenges as a confidentiality agreement was signed in order to protect Burgess Norton. Moreover, the team only has a vague idea of what is causing nicks in the piston pins and has yet to uncover the true source of the nicks. Moreover, Burgess Norton has a rather low failure rate, resulting in a statistically more difficult task.
- As the Pin Pals gain knowledge and experience with piston pins, that information will culminate to produce a highly effective solution to the nick problem that has plagued Burgess Norton for years.

Project Budget

Activity	Cost	Description
Testing Expenses	\$200	Materials and Apparatus to aid in testing
Design Expenses	\$200	Materials used to create final design
Transportation	\$100	Transportation reimbursement to and from Burgess Norton
Poster/Ipso Day Expenses	\$50	Office supplies or other items
Total	\$550	

Designation of Roles

Minute Takers: Terrence King & Sandrine N. Simen

Agenda Maker: Edilberto Barrera

Time Keeper: Krystian Ustupski

iGroups Moderator: Yun Seon Heo