

# Mechanical Forging for the Construction of a Standardized Steelpan Instrument

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## Abstract

This project is based on the need for reducing the potential harm of creating steelpan drums. The current process is a risk to the manufacturer's hearing and musculature structure, due to the need to hammer steel for hours at a time. The proposed method of automation for this project is through incremental sheet forming using CNC technology and G-Code.

## Introduction

Mechanical Forging for the Construction of a Standardized Steelpan Instrument is based on the proposal to reduce the time required to construct a steelpan drum. This process takes a number of weeks to complete by hand and is dangerous to the manufacturers. The proposal of the project is that the process can be automated by some degree through the use of incremental sheet forming with the use of a CNC machine. Due to the size constraints of the CNC machine at the NIU machine shop, the project was completed using a steel pail that is half-scale of a traditional steelpan.

## Methods and Materials

This project involves the use of a CNC machine created with an Aluminum framework using Arduino circuitry to operate the deformation process. SolidWorks is used to create a CAD model of the steelpan. The model is imported to FeatureCAM to create the toolpath and the G-code. The G-code is used to guide the machine through its process.

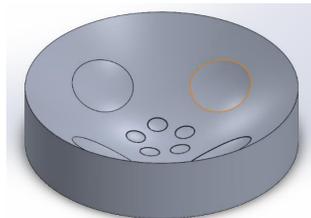


Figure 1. SolidWorks Model

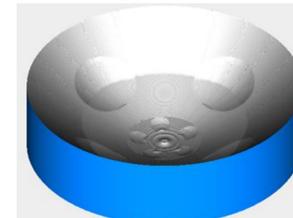


Figure 2. FeatureCAM Model

## Results

The final design of the steelpan drum was made from a steel pail with an inner diameter of 9.5" and with more accurate note indentations. The concave shape and note indentations were made with a rough operation created on FeatureCAM, then a finishing operation was used to smooth the surface.



Figure 3. Half-Scale Steelpan



Figure 4. CNC Machine

## Discussion

The successful deformation of the steel bucket is proof that the concept of incrementally forming steelpan drums is worth further study. To continue this research, the next step would be to perform this experiment on a full-sized oil drum with a sufficiently large CNC machine.

## Conclusions

The need to reduce harm to manufacturers has led to numerous attempts at speeding up the steelpan drum manufacturing process. Based on the results of this project, it appears that CNC-based incremental sheet forming can be a valid method of doing so. With more testing performed, this could be the next wave of producing instruments.

## Acknowledgements

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