Louisiana State University, College of Engineering

ME 1212, Section 1, Fall 2025

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Individual Teardown Report

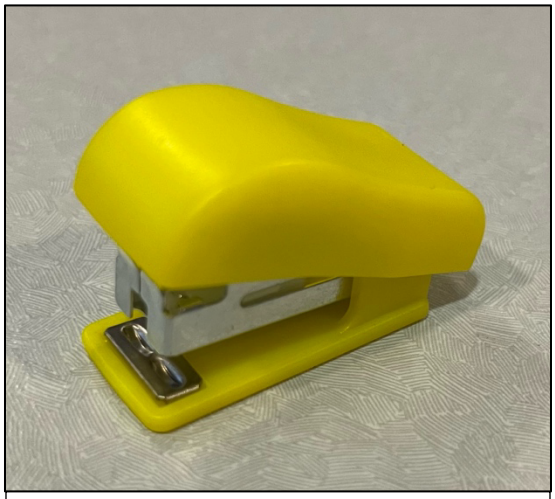

Figure 1. Intact yellow stapler

Abstract

An experiment was conducted to discover the form, fit, and function of the components of a stapler as well at translating the experiments into a formal lab report. The stapler was deconstructed, and the process was documented in individual steps. The base supports the stapler and holds the anvil. The handle acts as an input for force on the rest of the stapler. The carrier holds and guides staples to the front of the stapler and the pusher moves the staples to the front of the carrier. The hammer pushes the staples through the paper and into the anvil locking the staples in place by bending the staples legs as well as returning the stapler to its original position. The spring pulls on the pusher therefore moving the staples into position. Improvements to the anvil, base, and overall closing of the stapler would improve its functions and usage. The findings were them compiled into a formal and organized report detailing the process, form, fit, function, as well as improvements.

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Introduction

A stapler is an office tool used to fasten multiple pieces of paper together. Staplers come in varied sizes, colors, shapes, and designs but include a handle, base, hammer, spring, anvil, carrier, and pusher in their simplest forms. A stapler uses the input force from a user and transfers the force to a hammer that pushes a staple through the paper and bends it to lock the papers together. Staplers use a spring mechanism to move staples further within the carrier and a separate spring attached to the handle to return the stapler to its original position. Deconstructing a stapler not only allows individuals to learn about the form, fit, and function of the device but also allows for improvements to be made in terms of materials, design, and effectiveness. Disassembling a stapler helps to demonstrate the process of deconstruction of mechanical tools as well as practicing the process of writing a formal lab report.

An experiment was conducted to deconstruct a stapler and find the form, function, and fit of each component of a stapler and to document and detail the deconstruction and process of documenting the form, fit, and function. The experiment also allows for an analysis in how to make the stapler better as well as practice in transcribing the experience of taking the stapler apart into a formal report.

Procedure for Deconstruction

1. Safety glasses were put on and worn throughout the duration of the deconstruction.
2. Opened the stapler to reveal the internals and the flat head screwdriver was placed between the legs of the hammer and the handle and twisted, allowing for the hammer to slide out towards the back of the handle.
3. Then, using the flat head screwdriver the spring loop attached to the hammer was removed.
4. The flat head screwdriver was placed between the handle and base plastic pieces near the locating pin and twisted. The opposing side was then twisted to separate it from its pin as well, separating the handle and base pieces.
5. The flat head screwdriver was placed between the carrier and the bottom plastic piece and twisted removing the carrier from one pin. The carrier was then squeezed near the pins until it was free of them and pulled up, separating the carrier from the base.
6. The legs of the anvil were pressed from underneath the base with a flat head screwdriver, separating the anvil and the base.
7. The flat head screwdriver was used to press upwards on the tabs of the pusher located in the staple carrier channel releasing the pusher from the channel on one side and then the flat head screwdriver was placed between the underside of the pusher and the inside of the carrier and lifted upwards, removing the pusher from the carrier.
8. The spring was fully removed as it was taken off the tab of the pusher.

Functional Decomposition Tree

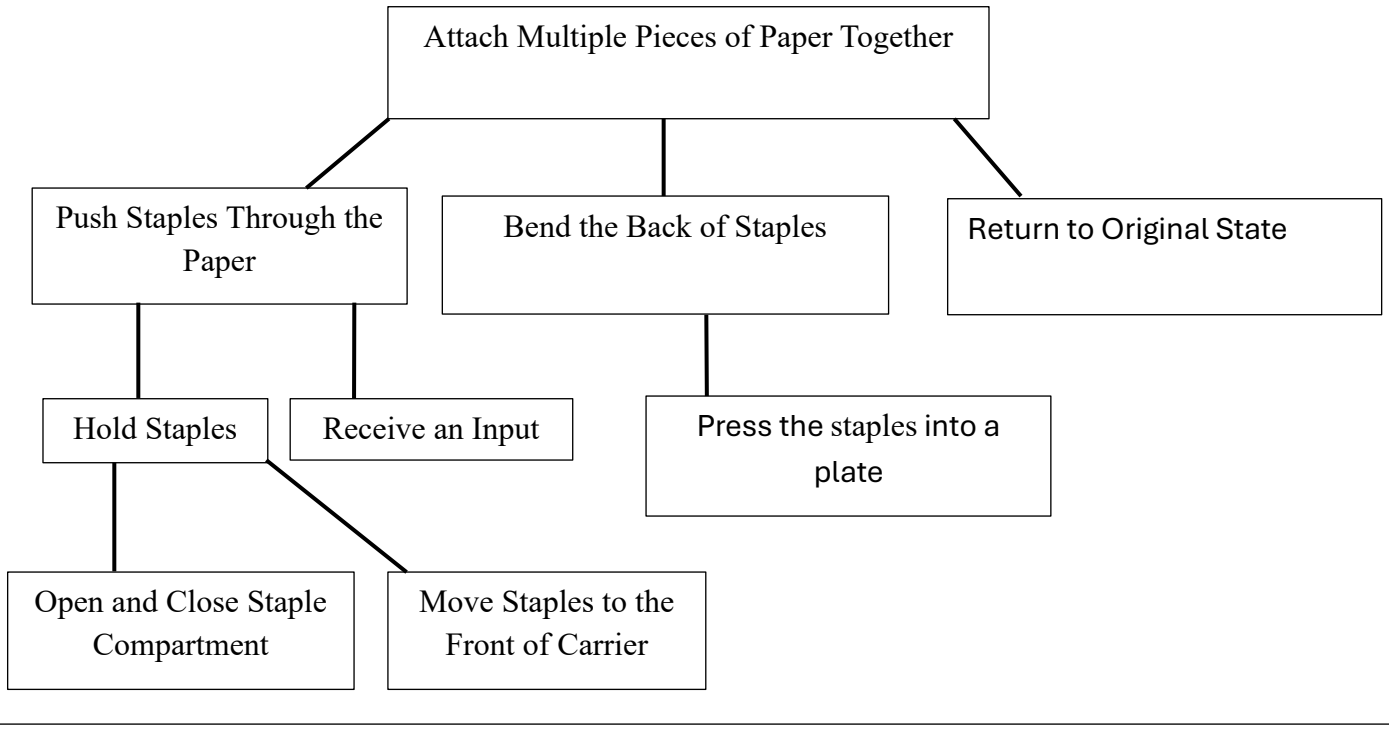

Figure 2. Functional decomposition tree for the functions and sub-functions of a stapler.

Form, Fit, and Function

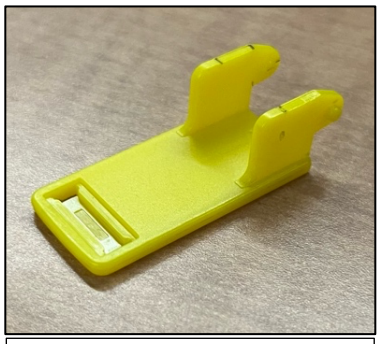

Figure 3. Base of stapler

Form: It has a rectangular base with a relief cut towards the front. There are two rectangles with semicircles perpendicular to the base that sit far enough apart to fit the carrier. The base is made of a yellow plastic.

Fit: Has a cutout for the anvil to slide into as well as to attached dowels that allow for the handle and the carrier to connect to the base.

Function: Supports the stapler and orientates it so that papers can be placed underneath the staples.

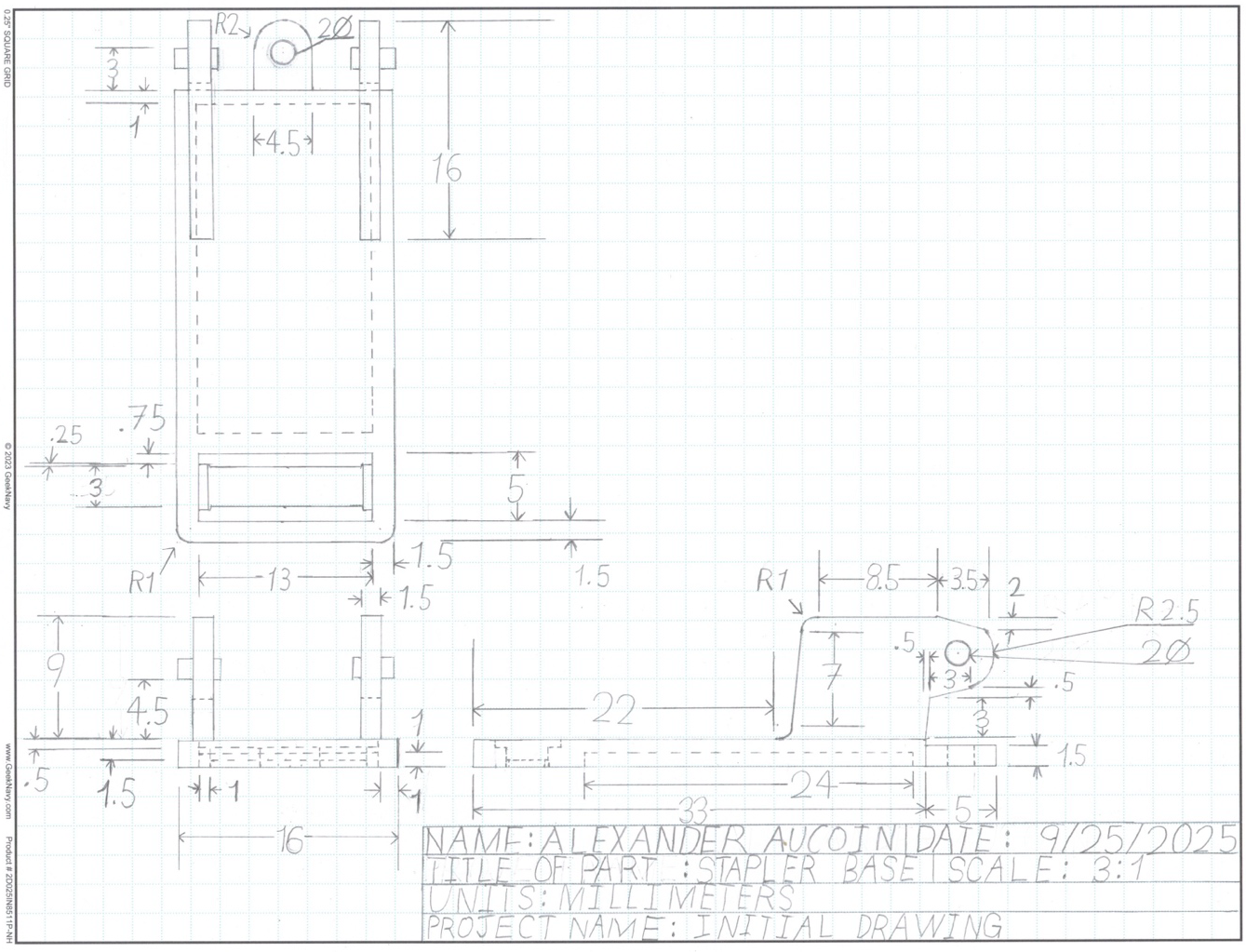

Figure 4. Engineering drawing of the base of the stapler.

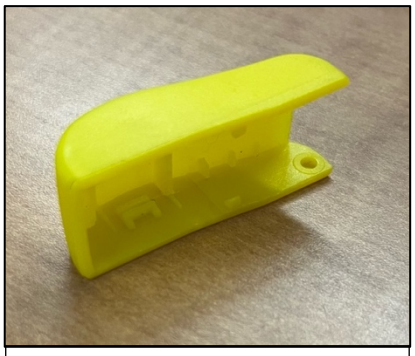

Figure 5. Handle

Form: The handle is 37mm ± 1mm long, 16mm ± .5mm tall as oriented in Figure 5. The left side in a top view has a radius of 12mm ± 1mm and a right radius of 5mm ± .5mm. The thickness of the walls is 1mm ± .25mm. The handle has two holes on the right in Figure 5. with diameter of 2mm ± .5mm. The handle is made of a yellow plastic.

Fit: Has two circular cutouts to allow for dowels to go through connect the piece to the base. Also has two sloped clips to hold the anvil in place with geometry behind the anvil to support force applied to it.

Function: Allows the user to interface with the stapler.

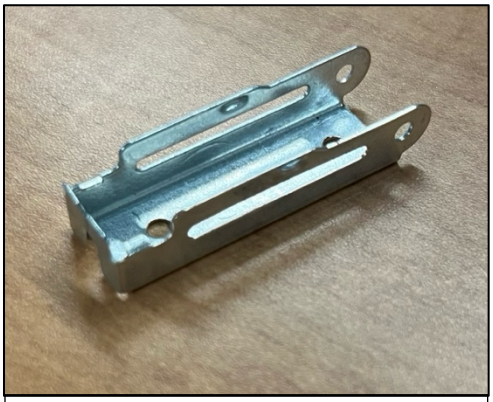

Figure 6. Staple Carrier

Form: The carrier is 31mm ± .5mm long and 18mm ±.25mm tall as shown in the orientation of Figure 6. The carrier has two parallel tracks 1.5mm tall ±.25mm and 20mm ±.25mm long with end diameter of 2mm ±.25mm. The carrier has a width of 10mm ±.25mm and a square cutout on the left side shown in Figure 6. with a diameter of 3.5mm ±.5mm and expanding to a slit 10mm ±.25mm wide on the bottom left. The pusher has two holes on the right side with diameter 2mm ±.25mm as well as round of 5mm ±.25mm on the outside of those holes. The carrier is made of a silver metal.

Fit: The carrier has two channels to allow the pusher to move horizontally and move staples as well as two circular cut outs to allow dowels to connect the carrier and the base. The carrier also has a slit in the front to allow staples to be hit with the hammer and pushed through the papers.

Function: Hold and act as a guide for the staples before they are pushed into the paper.

Figure 7. Staple Pusher

Form: A rectangular top with two rectangles perpendicular on the sides as well as a rectangular protrusion connected to the underside of the top. The pusher is made of a white plastic.

Fit: Two rectangles on the outside of the part slide into the channels of the carrier. The spring attaches to the protrusion and allows the pusher to move the staples to a position to be hit by the hammer through the paper.

Function: Move staples into position allowing the hammer to strike them through the paper.

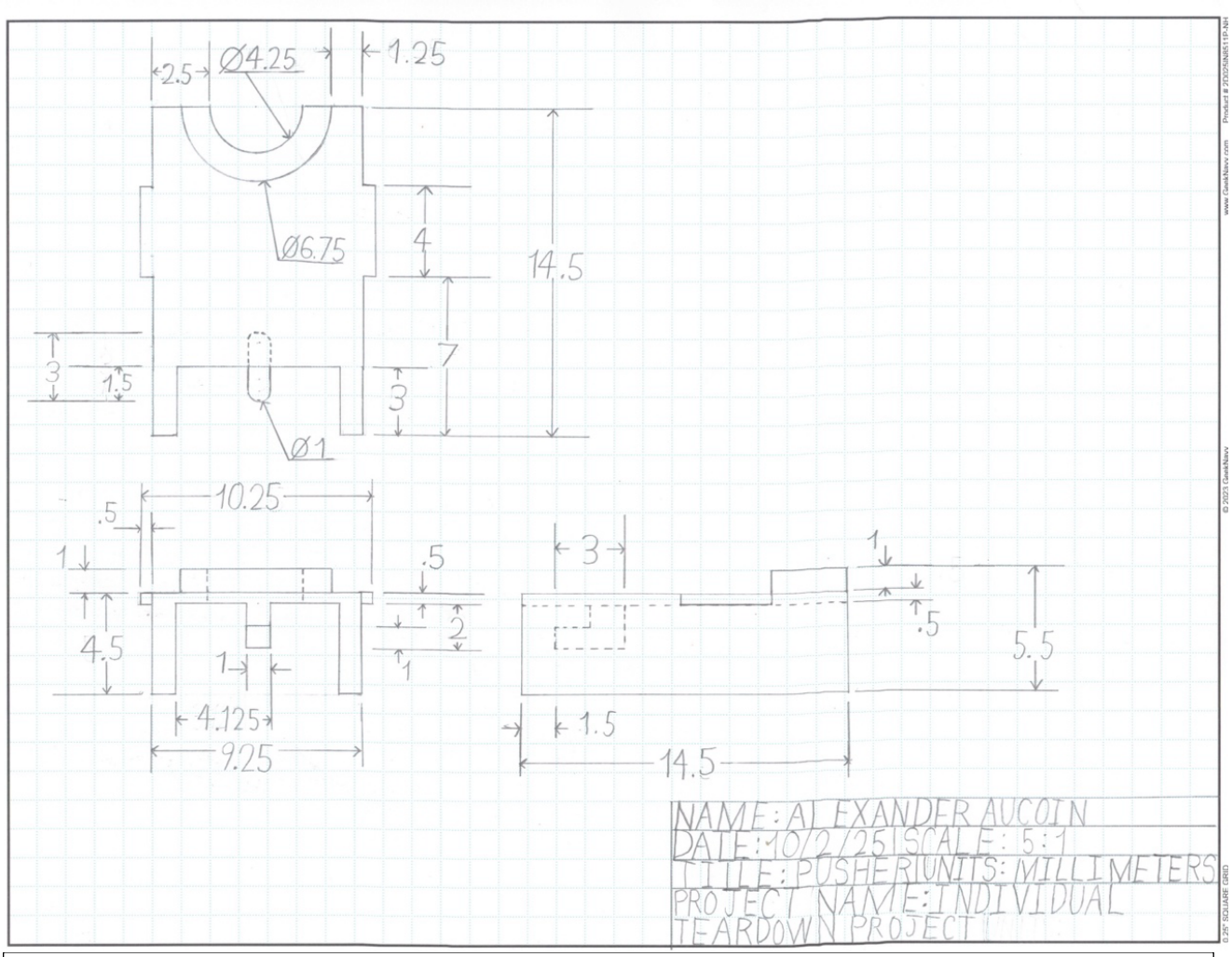

Figure 8. Engineering drawing of the staple pusher.

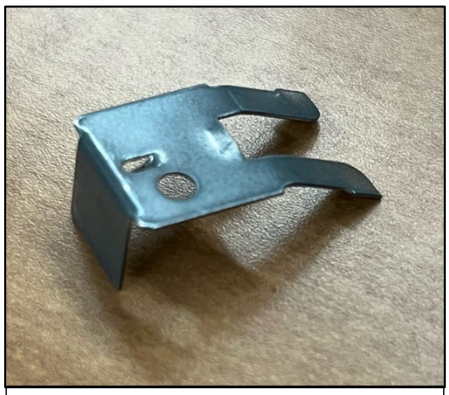

Figure 9. Staple Hammer

Form: The hammer is a rectangular shape and is bent at 90 degrees. Additionally, the back of the hammer has a rectangular cutout leaving two rectangular legs on either side. The hammer is made of silver metal.

Fit: The hammer is thin enough to press into the handle's clips and be held in place, while the portion of the hammer that points straight down is also thin enough to fit through the carrier and hit one staple at a time. The hammer also has a metal hook that allows the spring to attach to the top portion of the stapler and provide a moving force on the pusher to move the staples forward.

Function: Separates individual staples and provides the force to press the staples into the anvil, bending the back of them to secure them onto the paper. Returns the stapler to its original position when the legs flex and become like springs when the handle is compressed and the legs push the stapler back to its original position.

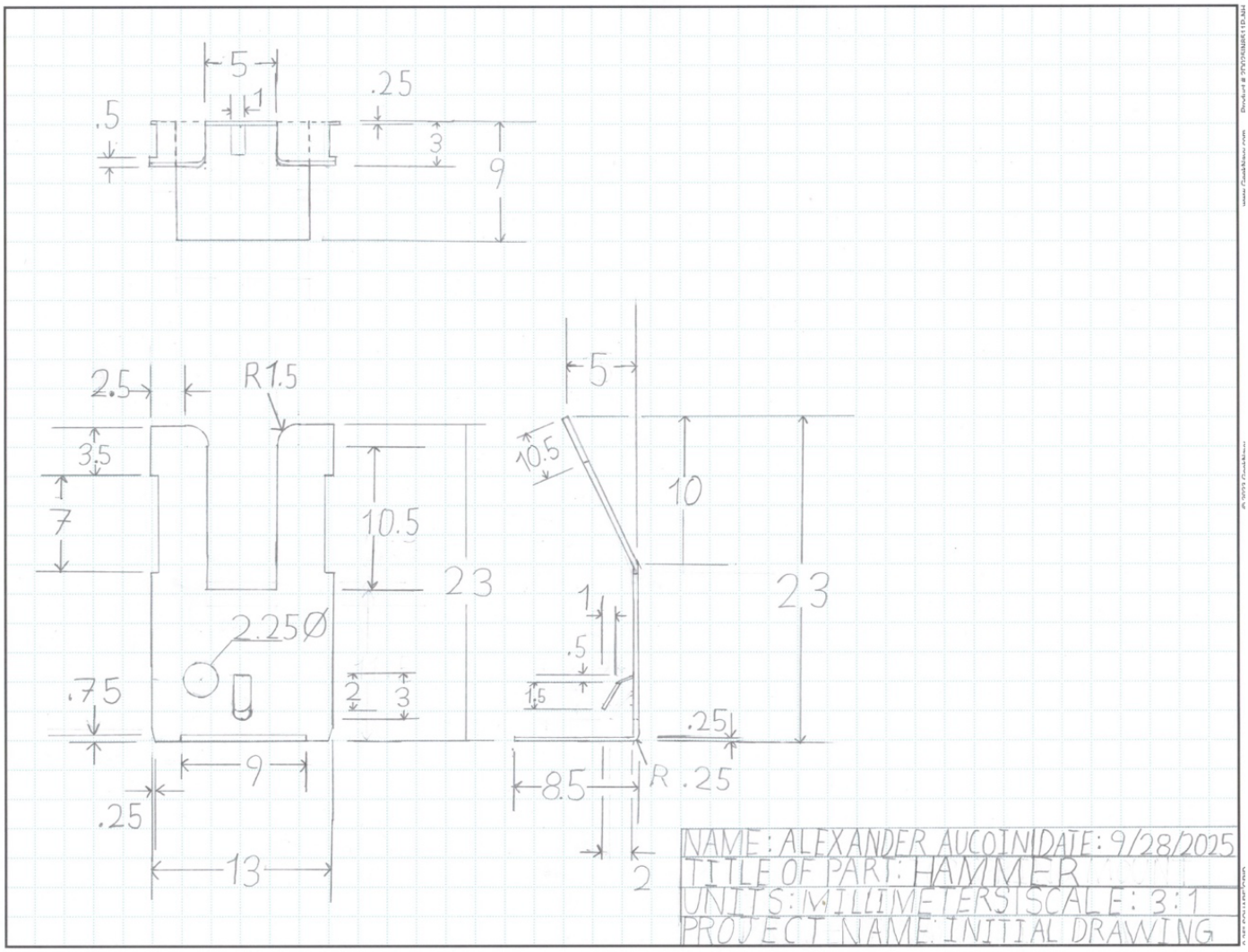

Figure 10. Engineering drawing of the hammer of the stapler.

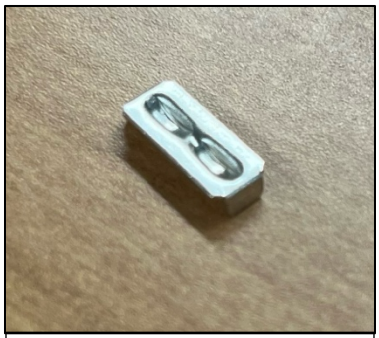

Figure 11. Anvil

Form: The anvil is a small rectangular piece with two divots in the top and two rectangular legs. The anvil is made of a silver metal.

Fit: The legs allow the anvil to fit into the base of the stapler, and the divots allows the hammer to press the staple into the anvil and bend the staples.

Function: Bends the back of staples when the hammer presses them into the divots in the anvil.

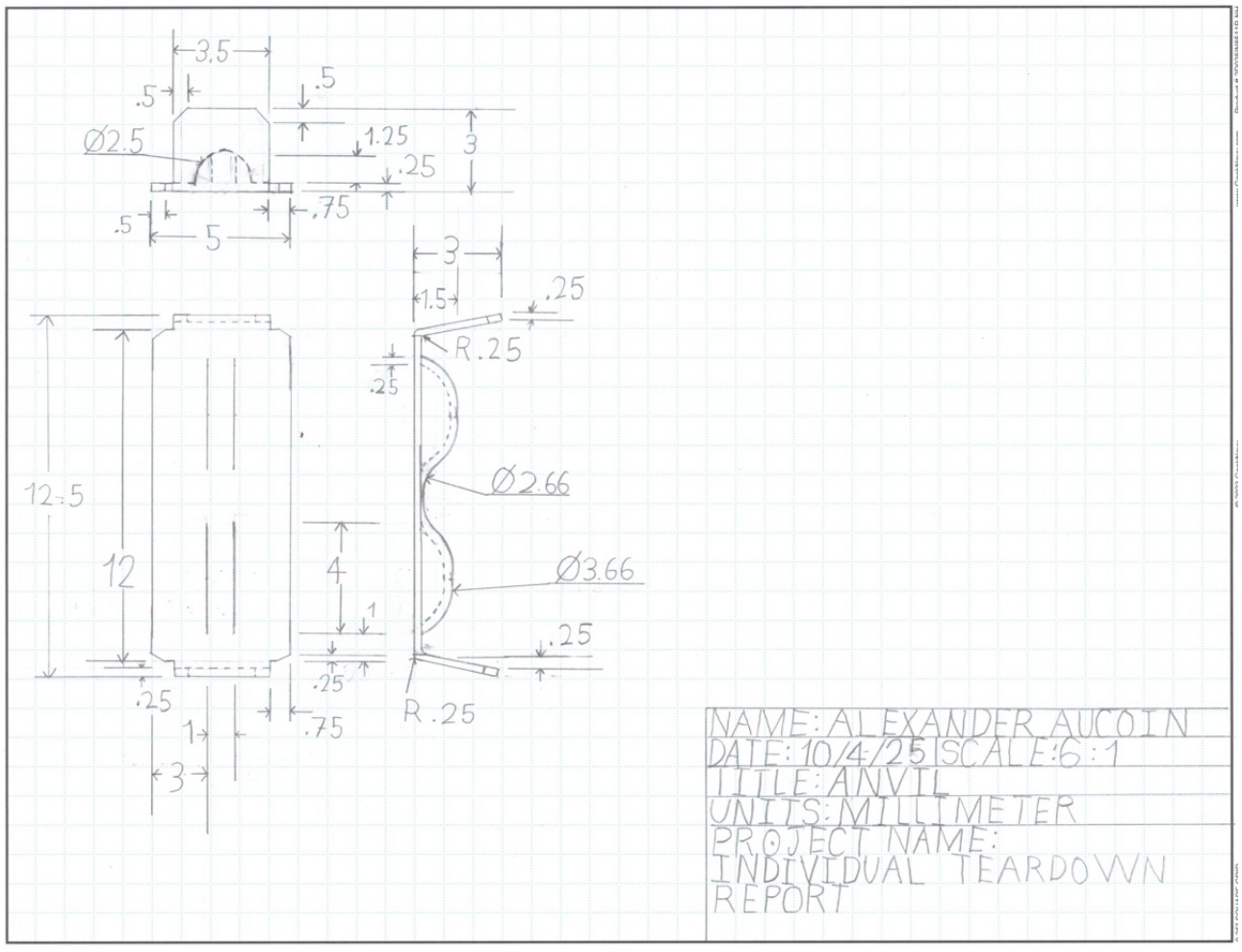

Figure 12. Engineering drawing of the stapler anvil.

Figure 13. Warped spring from deconstruction procedure of the stapler shown.

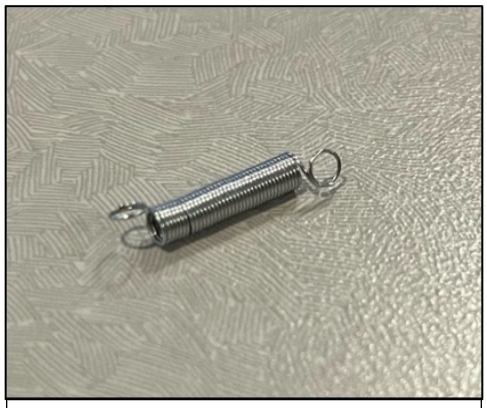

Figure 14. Spring from another stapler with original shape and form.

Form: The bent spring is 21mm ±1mm in length and has a diameter of 3.5mm ±.25mm with the diameter of the ends of the spring having diameter of 4mm ±.25mm. The length of the spring without either loop on the end in 13mm ±.25mm. The spring is made of a silver metal.

Fit: The spring has two loops on either end to allow it to hook onto the pusher and the hammer.

Function: Moves the pusher towards the front of the stapler placing the staples into position.

Proposed Improvements

1. Improved Anvil Design

    One change to the design of the stapler would improve its capacity to keep papers together would be creating an anvil with a tighter radius bend. The current anvil does not close the legs of the staples back onto the head of the staples once bent, but creating an anvil that would bend the legs all the way around improves the stapler's capacity to keep papers together once stapled instead of having loose staples that could be torn out.

2. Ergonomic Base Design

    Another proposed change to the design of the stapler would be creating a base that is suited to fit into a user's hand to allow increased input force. The current design accounts for the stapler being placed on a flat surface when used however multiple users showed that the default in using the stapler due to its small size was to place the stapler between the index and middle fingers on the base with the thumb acting as an input on the handle. Therefore, if the common user does not place the stapler on the table creating a more ergonomic design of the base that is shaped to the hand would allow users to apply an increased force on the stapler when it is in the air.

3. Locking Tabs for Base and Handle

    When leaving the stapler in a bag with other tools; pencils, calculator, and notecards; the stapler repeatedly wanted to open to the point of flexing so far it would break the stapler and become unfunctional. Adding a small divot onto the base near the locator pins for the handle and adding a protrusion on the inside of the handle to match would allow the stapler to snap closed and require an increased force to open. This would

prevent the stapler opening on its own and prevent the handle and hammer assembly from breaking off the base. The divot and protrusion require a user to directly open the stapler to access its components rather than the stapler accidentally opening on its own when it should be closed.

Conclusion

Throughout the experiment I was able to demonstrate the deconstruction of a stapler and its components as well as the form, fit, and function for those components. Using the stapler as well as taking it apart showed the handle to be the point of input for the stapler as well as showing that it connected to the rest of the stapler with small pins. The base acted as a strong support so that the rest of the components could function as necessary to complete the overall function of the stapler. The carrier held the staples and guided them towards the position in which they could be pushed through the papers while also connecting to the handle and base using small holes to connect to pins of the handle and base. The pusher moved the staples towards the front of the stapler and moved along a track in the carrier. The hammer acted as the component to push the staples out of the carrier, through the paper, and apply the force to bend the staples keeping them in place. It also showed the use of tabs in keeping the hammer in place within the handle and using a tab to keep the spring attached to the top components of the stapler. The hammer also acts to return the stapler to its original position so that it can be used again. The anvil bent the legs of the staples and kept them attached to the papers and itself fit in the base with two small legs. The spring moved the staples towards the front of the stapler through providing a force on the pusher as well as keeping the stapler in an opened or closed position.

The spring was bent and deformed in the process of disassembly due to poor deconstruction skills and excessive force so a figure showing the spring that was deformed as well as an undeformed spring from another stapler was included to show the difference in the final shapes. However, the deformation of the spring does not affect its function or fit but, does change the form of the spring.

Additionally, deconstructing the stapler allowed the skills and process of taking it apart to be translated into a formal lab report detailing the process and components in an organized manor.

Appendix

ME 1212 Individual Teardown Report – Peer Feedback Form Fall 2025

Reviewer name: Parker Seibel **Reviewee name:** Alexander Aucoin

Score 0 – 10 in each category. See detailed rubric for more information. (0) Not included/ incorrect (4) Ineffective (7) Adequate (8) Effective (10) Outstanding

Item	Score (0 – 10)	Comments, notes, and relevant page numbers
Cover page	10	I like the border on the image
Table of Contents	10	The border here is nice as well. The Page #'s are accurate and organization is professional.
Grammar, spelling, and punctuation	9.86	One misspelled word, just run "Spell check" to make sure
Syntax/Style	10	Commas are used to break apart big sentences. Sentences are coherent and well written.
Organization/Support	10	Very good support of ~~ergo~~ arguments. Org. is good/clear.
Introduction	9	Overall well written, just needs purpose.
Deconstruction Procedure	10	Detailed list, very followable
Functional Decomposition Tree	10	You might want to flip arrows. Functions are accurate.
Form – Photographs (for each device component)	10	
Form –Dimensioned Drawings (for at least four device components)	9.999	enlarge figure 17, everything else is appropriate.
Form/Fit/Function Description (for each device component)	10	Drawings are neat and clear. Scanned in well, allows for a clear image when printed.
Proposed improvements to the device, w/justification	10	I did not consider a lock system. Clever.
Conclusion	10	I would summarize the improvements again.

Instructions on back

Figure 15. Front of peer feedback form.

Additional comments and notes

Instructions for Peer Review

Reviewer: Please fill out this feedback form for the Draft 1 Individual Report you are reviewing. Carefully review the detailed rubric for examples of Ineffective/ Adequate/ Effective/ Outstanding qualities in each category. Provide comments and evidence (with page number) where appropriate to justify your score. You will be graded partially on providing meaningful feedback.

When you finish:

1. Take a picture of the form you completed and upload it to the "In-Class IR Peer Review Feedback" assignment on Gradescope before you leave class.
2. Give this form to the reviewee for inclusion in their Final Draft report.

Reviewee:

1. Read through the feedback from your peer, and consider whether or not you need to make changes to your report for your Final Draft.
2. Scan this completed form and include it as an appendix in your Final Draft report.

Figure 16. Back of peer review form.