

PRODUCT SPECIFICATION

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Goat Stanchions Product Requirements

Billy Goats Gruff

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Document History

Rev Number	Date	Modified By	Reason
0	22 nd June 2019	Skylar Ovnicek	Initial Release
1	2 nd July 2019	Luke Johnson	First graded revisions/portfolio release

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1 Objective

The objective of this document is to record the requirements associated with designing a goat stanchion and production process to be followed by Peterson Metal Products based in Leadore Idaho. This document also serves to establish the basic requirements of the goat stanchion and goals for production.

2 Scope

The scope of this project is to provide any and all details regarding a CAD model of the finished product, as well as a physical small-scale representation of the product to be shipped to PMP for approval. Additionally, provided that there is enough time, the shipment packaging is to be considered and planned.

3 References

3.1 Cited Documents

This is place to cite any relevant standards, regulations, etc. relevant to the requirements...

3.2 Acronyms

PMP - Peterson Metal Products LLC

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4 Functional Requirements

4.1 User Interface Requirements

- The user shall have to expend no more than 30 lbs of force when operating the release mechanism.
- The user shall have to expend no more than 10 lbs of force when operating the feed dispensing mechanism.
- Udders must be easily accessible for attaching milking device while the operator is standing.
- The user must be able to access the floor and walls for cleaning.
- Feed pans must be visible or discard visibly so the operator can see if goats are eating.

4.2 Operational Requirements

- The goats must self-load into all pens within 1 minute after entering the device, without operator assistance.
- The goats must enter in a single file line and self-sort into the pens without the opportunity of skipping any sections.
- It must be possible for the operator to dispense food into bins at the front of all pens simultaneously.
- It must be possible to release all goats simultaneously such that they can exit their pens in less than 30 seconds.
- The doors to each pen must close automatically after the goats are released.

4.3 Animal management Requirements

- The goats must not be able to steal food from adjacent food troughs.
- The goats must not be able to escape.
- There shall be no gaps in the flooring or walls where animal appendages could get stuck.
- There shall be no sharp edges or pinch points in places where animals will be in contact with.
- The flooring must provide enough traction to avoid animals slipping.

5 Mechanical Requirements

5.1 Strength Requirements

- The design shall be able to carry a static load of 1000 lbs per two goat sections.
- The device's floor will be able to withstand the full force of a goat bounding without sustaining damage.

5.2 Spatial Requirements

- The device will not exceed a single foot longer than a goat,
- The device will occupy only the minimum width that allows for the set of goats
- The height of the device will be optimal for reaching the goat's udders

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5.3 Weight/Mass Requirements

- The total system shall weigh no more than 120 lbs.
- For ramp enabled systems, the ramp shall not exceed 45 lbs
- The system shall not be so heavy that a single person cannot put it onto the stand.

5.4 Mounting / Interface Requirements

Our current design will have four primary components. These components give the design modularity. The base component by itself will serve to perform the main job of the device. The other components are designed to allow the device to be placed in several other settings.

5.4.1 Main Device

The main device consists of the self-acting doors that divide the animals, the exit gate that also contains the feed holders, and all the bars that hold the goats in place.

5.4.2 Elevation Stand

The Elevation Stand is the device that holds the main device a set distance off of the ground for farmers that plan on using the device as a standalone system. The elevation device must be sturdy and able to resist the elements.

5.4.3 Entrance ramp

The entrance ramp is the portion of the device that allows the goats to get onto the device when it is used with the elevation stand. It must have railings such that the goats are prevented from jumping off of the ramp once they have entered it.

5.4.4 Exit Ramp

The Exit ramp is also a necessary component when the elevation stand is used. It is required not to be so steep that the goats are encouraged to jump. Additionally, the ramp needs to be secure enough that the goats cannot dislodge it.

5.5 Appearance Requirements

Our final design will follow advice from Dale of PMP by using dark earth tones to paint the goat stanchions with. It was indicated to us by Dale that the earthy tones will decrease sheep/goat hesitation with the product as opposed to brighter colors. Additionally, the coating to be considered is the coating that he represents, which is called Plascoat

5.6 Durability Requirements

Given the amount of use indicated by the goat farmer our team met with, each goat stanchion will need to be opened and closed about 500 times a season (roughly a 7-month period). With this in mind, we believe that our system

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should be expected to last 90000 cycles for each stanchion, which allows for the different milking periods of other small dairy animals.

We expect minimal wear and corrosion to occur on the material because of the Powder-Coat product that will be recommended for a coating used by PMP before delivering to distributors and customers.

5.7 Reliability Requirements

All components (bearings) shall have 90% reliability

6 Environmental Requirements

6.1 Environmental Sealing

The coating that PMP will be advised to incorporate onto our product will be able to withstand temperatures below 120°F (49° C) with the application of the Powder-Coating product recommended to PMP.

7 Regulatory Requirements

7.1 Requirements

The components shall comply with the standing regulations on dairy production that include the ability to clean it, and to not store chemicals.

7.2 Shipping Requirements

Our product is going to need to be compactable to deliver potentially high volumes of the product at a time, as well as other products being transported. We will design our product to fit within a crate format for PMP to decide if it is necessary to incorporate as needed.

8 Cost Requirements

8.1 Prototype Cost

Cost to build a POC prototype shall not exceed \$4000.

8.2 Production Requirements

- The Product shall be manufacturable at a rate of at least 1 per day, or as consumer demand requires, and incorporate CNC plasma cutting.

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9 Electrical Requirements

- The device will incorporate an electrical feeding system similar to what we saw at Randall Stoker's Sheep Dairy farm, this device will run on 120V AC as found in all wall outlets in most of the United States.
- The feed mechanism will easily and simply feed the animals while only needing to be filled in one location.

10 Schedule Requirements

The following are the major Project Milestones:

- Project Schedule Due July 1, 2019
- Portfolio, Initial Wikipage Due July 5, 2019
- Snapshot #1- Wikipage Review July 8, 2019
- Design Validation Plan Due July 15, 2019
- Project Value Proposition Due July 22, 2019
- Concept Design Review (Client & Instructor) July 25, 2019
- Snapshot #2 – Snapshot Storyboard Display in GJ August 1, 2019
- Portfolio, Wikipage, Team Member Citizenship Due August 2, 2019

- Engineering Release Review (with client & lead instructor) September 27, 2019
- Portfolio Review October 10, 2019
- Snapshot #3 October 15, 2019
- Snapshot #4 December 6, 2019
- Final Deliverables (Final Prototype, Report, Portfolio, Etc.) December 13, 2019