Ultimate 608 Bearing with Calibration Kit V2

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VIEW IN BROWSER

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Summary

Bearings with different tolerances and calibration framework for your mechanical prints.

Hobby & Makers > Mechanical Parts

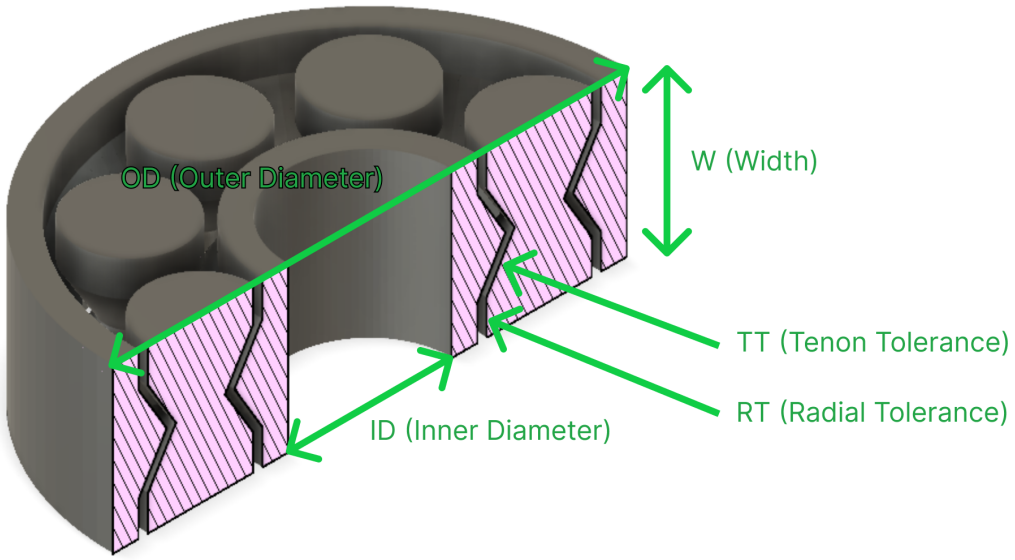
Tags: printinplace bearing tolerance

Versions:

V2, 10/18/2022: Fixed inner diameter to match 608 specification. Added extreme tolerances for perfectionists.

Unfortunately, "Bearing.stl" is something you can't just download and print. Most of the time it won't work properly because you equipment, material and environment are unique. Should we give up and consider bearings non-printable? I don't think so.

This project's goal is to give you instruments to print 608-size bearings reliably and predictably. I included methodology to achieve the best bearing possible using almost any FDM printer.



Bearing Tolerance Calibration:

I achieved the best results with 0.16 layer height and PLA + grease to reduce heating and last bearing lifetime.

At first, you need to identify tolerances which will give you the best results. There are 2 tolerances to identify:

1. Radial Tolerance (**RT**)
2. Tennon Tolerance (**TT**)

The goal is to get working bearing with as small RT and TT values as possible. To do that, I suggest using a binary search algorithm. Search for the minimal RT first. Once you have RT, search for minimal TT.

Binary Search for RT and TT:

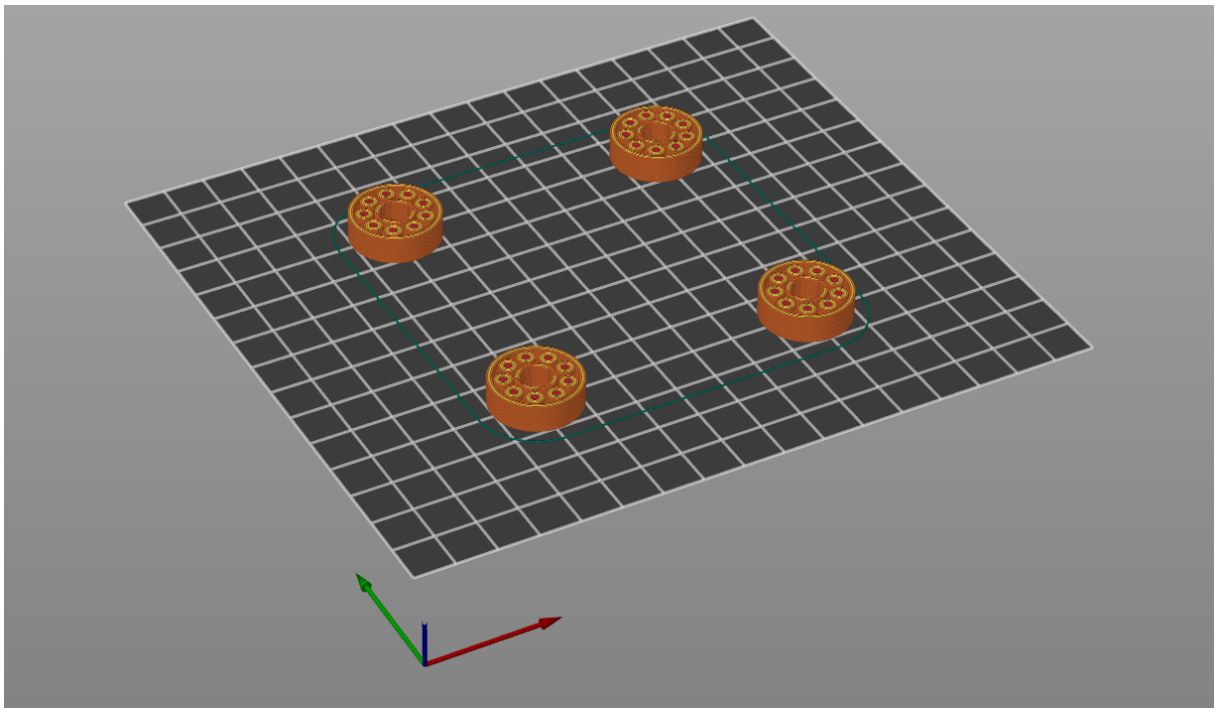
1. Start with RT=X, and set TT=0.4 while doing that.
2. X is the variable you are looking for (start with X = 0.2, X_min=0.1, X_max=0.4) and print the right model from “calibration” folder.
3. Rotate the shaft (the first time it may be hard, use "tool.stl").
    1. If you are able to rotate it freely afterwards, set X_max = X, X = (X_max + X_min) / 2 and repeat 2.
    2. If the shaft doesn't rotate or you broke the bearing, set X_min = X, X = (X_max + X_min) / 2 and repeat 2.
4. Once you found minimal RT, repeat the same to find minimal TT.

Print a lot!

You have one working bearing, great! Since you spent a lot of time on calibration, it would be nice to print a few of them using the same filament

and settings. Don't repeat my mistakes, **don't print them like that** (unless you would enjoy 25 non-working bearings):

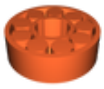
If you print all of them in one go, tolerances may drift. The reason is not clear to me, probably smth related to retracts on a longer distance. Print them one-by-one using Prusa Slicer's “Print Settings → Output Options → Complete individual objects” and position them far away from each other:



I made those bearings parametrical and thought about making such a kit for all popular bearing sizes, but rendering for 608 size only took ~10 hours. Please let me know in comments if you would like to have the same kit for other bearing sizes.

Model files

Final 81 files



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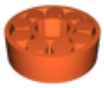

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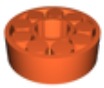

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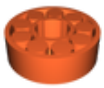

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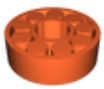

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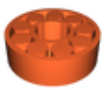

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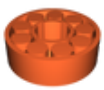

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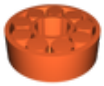

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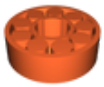

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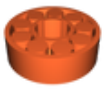

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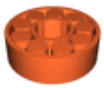

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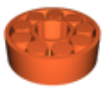

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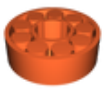

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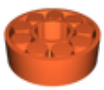

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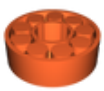

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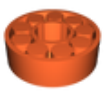

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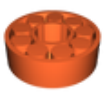

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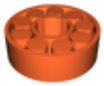

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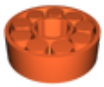

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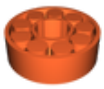

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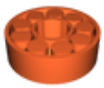

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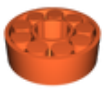

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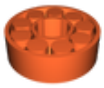

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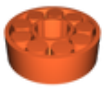

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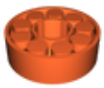

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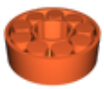

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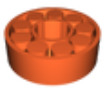

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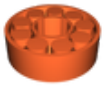

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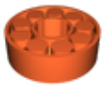

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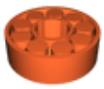

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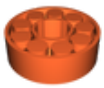

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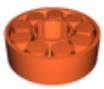

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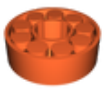

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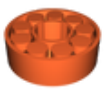

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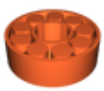

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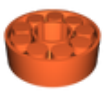

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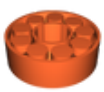

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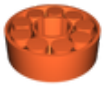

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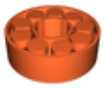

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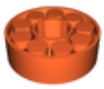

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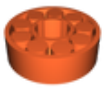

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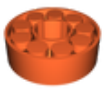

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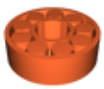

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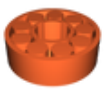

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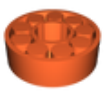

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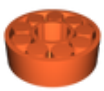

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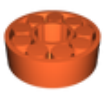

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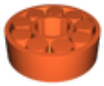

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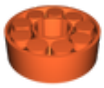

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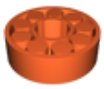

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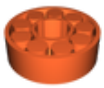

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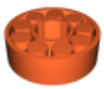

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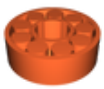

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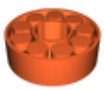

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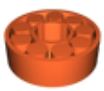

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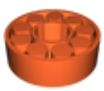

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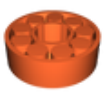

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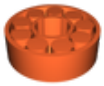

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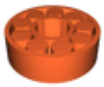

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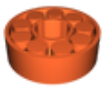

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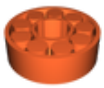

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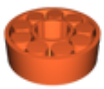

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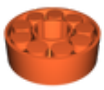

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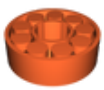

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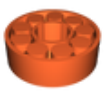

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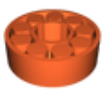

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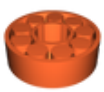

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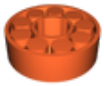

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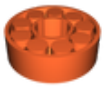

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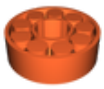

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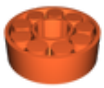

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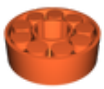

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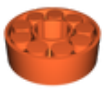

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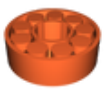

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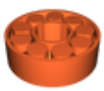

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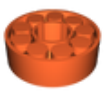

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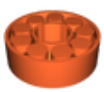

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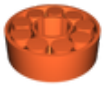

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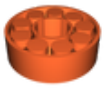

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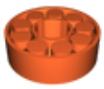

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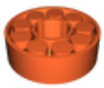

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Calibration 81 files

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tr_03_tt_04.stl

tr_03_tt_005.stl

tr_04_tt_00.stl

tr_03_tt_025.stl

tr_03_tt_015.stl

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tr_00_tt_035.stl

tr_02_tt_005.stl

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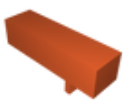

tool.stl

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