4.1 Roller Design

Roller trainers require the cyclist to be travelling at some speed for stability. Thus, the expected operating range of a cyclist on the trainer will typically range between $10\,\mathrm{km\,h^{-1}}$ and $50\,\mathrm{km\,h^{-1}}$. For the design, a maximum high speed of $60\,\mathrm{km\,h^{-1}}$ was considered. The corresponding drum speeds for common drum size options are shown in Figure 4.1 below.

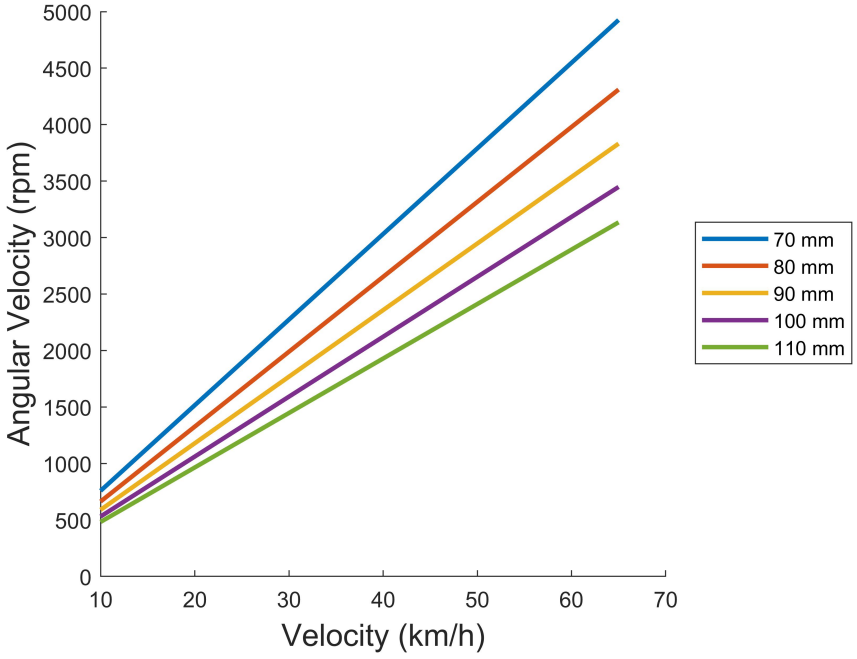

Figure 4.1: Rotational Speed of Roller Size Comparison

Considering the design of the Eddy Current brake, as discussed in Section 4.2, higher braking force can be achieved at higher drum speeds, and result in a larger operating range. On the other hand, higher speeds will also increase the free-rolling resistance of the trainer, and allow for less range at higher speeds. Thus, 90 mm drums were identified as a good compromise, and were selected as the best option for the platform.

The rollers were designed to consist of class-12 Unplasticized Polyvinyl Chloride (uPVC) pipes attached to EN-8 steel shafts. The bearings that were used are 6902RS deep groove ball bearings with rubber shields on both sides.