

A novel mount for attaching an automatic fish feeder to a circular tank

Abstract

Automatic electrically-powered feeders are routinely used in aquaculture to reduce the labor associated with hand-feeding and improve fish-rearing efficiencies. However, mounting automatic feeders to tanks can be challenging because of the variety of types and sizes of fish-rearing tanks. This paper describes a simple, durable, easy-to-use, and relatively easy-to-fabricate bracket for mounting an automatic fish feeder onto a circular rearing tank. This mount uses a simple, reinforced flat aluminum frame secured to the tank with clamps. The feeder is attached to the mount with a solid aluminum rod. This mount has been continually used for over a year in six, 3.66-m diameter circular tanks at a production fish hatchery with no issues and no maintenance required.

Keywords: mount, automatic feeder, circular tank, fiap, aluminum

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Introduction

Feeding is one of the highest priorities when rearing fish. Both manual (hand) and mechanical (automatic) feeding methods are used. Hand-feeding is beneficial because it provides a frequent opportunity for hatchery staff to view the fish and ascertain water quality, fish health, and other rearing conditions.¹⁻⁴ However, hand-feeding is also very expensive because of the high labor requirements and inefficiencies compared to automatic feeders.^{1,3}

While automatic feeders can be relatively expensive to purchase, their long-term costs are much less than hand-feeding.^{1,5,6} Using automatic feeders to deliver food at frequent and regular intervals throughout the day can improve fish growth, feed utilization efficiencies, and water quality.^{1,3,7}

Automatic feeders using electricity are commonly used in aquaculture. These feeders typically have a hopper to store feed which is then dispensed by an electrical motor.^{8,9} An electrical timer is set to determine the feed timing intervals and duration [9]. The use of electrical feeders and timers in particular has been shown to improve both rearing water quality and overall feed conversion ratios in fish.¹⁰⁻¹³

While a variety of electric feeders are commercially available, feeder mounts are not and typically must be made.¹⁴⁻¹⁶ With uncovered (open-on-top) fish-rearing tanks, an automatic feeder can be suspended above the tank. This is not a mounting option when tanks are covered to improve rearing performance or prevent fish escapement.^{15,16} Thus, automatic feeders must either be placed on a stand or mounted onto the side of the tank. This paper describes an innovative, simple, inexpensive, and durable mount for securing an electrical feeder to the side of a circular tank.

Material and methods

All of the feeder mount design, fabrication, and evaluation occurred at McNenny State Fish Hatchery, rural Spearfish, South Dakota USA. The mount was specifically designed for use with a Fiap Auger Fish Feeder (model FS4022R2, FIAP GmbH, Ursensollen, Bayern, Germany) to be installed at the side of a 2.7-m diameter partially inground circular rearing tank. McNenny Hatchery uses

six such tanks for fish production. Figure 1 is an image of the feeder mounted, located over the 38-mm lip at the top edge of the tank.



Figure 1 Image of a mount and automatic feeder installed on a 2.7-m diameter partially-in ground circular rearing tank.

The electrical feeder hopper was modified so that it could be joined to the mount. Using a drill, two, 22-mm holes were made in-line into the feeder hopper, just below the point where the hopper diameter expands to accommodate the lid. A mounting rod was inserted through the two holes and served as the support for the feeder as described in the following paragraphs.

The mount was constructed of grade 6061 aluminum. Two pieces of flat stock aluminum (6 mm thick, 76 mm wide, 635 mm long) comprised the vertical sides of the mount (Figures 2-4). The top piece, welded at a right angle to the two sides, was made using the same aluminum flat stock, and 314 mm long. A 314 mm-long piece

of 3.81-mm aluminum angle was welded as a crosspiece at a distance of 23 cm from the bottom of the mount to complete the rectangular frame. Two 63.5mm holes were drilled at a distance of 40 and 50mm from the bottom and centered on each side.



Figure 2 Side view of a mount for an electric automatic feeder.

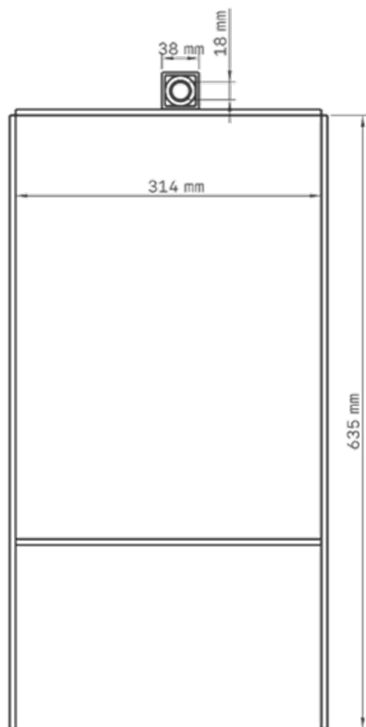


Figure 3 Front view of a mount for an electric automatic feeder.

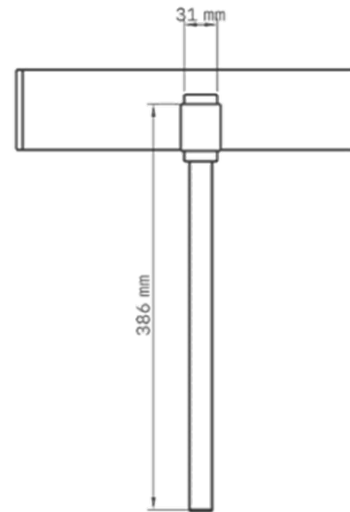


Figure 4 Top view of a mount for an electric automatic feeder.

A steel tab (5.08 cm wide by 10.16 cm long) was welded onto the closed portion of a 15.24 cm C-clamp (Quick-grip model 225106, Irwin Industrial Tools, Huntersville, North Carolina, USA). Two, 63.5mm holes were drilled through the tabs to match the holes in the aluminum sides. The modified C-clamp with the tab was then painted to prevent rust. The C-clamps were attached to each side piece (leg) of the mount using two 63.5-mm wide by 254-mm long stainless-steel bolts secured with stainless steel nuts. The clamps secure the feeder mount to the side of the rearing tanks (Figure 5).



Figure 5 Image of a mount and electric automatic feeder, with the C-clamp tanks used to secure the mount to the side of the fish rearing tank clearly visible.

At the center of the top of the frame, a 44-mm long section of 3.81-cm square aluminum (3-mm thick) tubing was welded to the flat

aluminum. A 63-mm long and 0.635 mm thick round section of 32-mm outside and 23mm inside diameter aluminum tubing was inserted into the square tubing and welded into place. Inserted into the round tubing was a 570-mm long, 22-mm diameter aluminum rod with a 4.76-mm hole. The hole was located approximately 12 mm from each end of the rod. The holes allowed for the insertion of stainless-steel hitch pin clips to secure the feeder after the rod was inserted through the tubing and through the feeder (Figure 6). By removing one of the pins, the feeder can be easily and quickly separated from the mount for cleaning or other maintenance.



Figure 6 Top view image of a mount and electric automatic feeder.

Results

The feeder mounts were evaluated during nine months of use holding feeders in the six inground circular tanks at McNenny Hatchery. During that time, there was no breakage of any of the structures. The mounts securely attached the feeders to the tanks, and no issues were observed with the performance of the automatic electric feeders. By allowing these automatic feeders to be used, the mounts dramatically decreased labor requirements for feeding and also improved fish-rearing performance.

Discussion

The effectiveness of the mounting system described in this paper facilitates the use of electric feeders in covered circular tanks during fish rearing. Thus, the benefits of automatic feeding regarding improved water quality, fish growth, decreased feed conversion ratios, and decreased labor requirements can be realized.^{1,3,7,10–13} In addition, the benefits of covering rearing tanks to prevent fish escapement and improve fish rearing efficiencies can also occur.^{15,16}

Although there is a large need for different feeder mounts because of the wide variety of fish-rearing units and the lack of commercially-available mounts, few mounts have been described previously.¹⁷ The feeder mount described in this paper, although customized for the circular tanks at McNenny Hatchery, can easily be used in other rearing units. The clamps used to secure the mount to the tank are adjustable, allowing the mount to secure feeders to the side of nearly any size and shape of the hatchery tank.

The simplicity, low cost, and ease of construction of the feeder mount described in this paper allows for its widespread use. C-clamps, aluminum flat stock, and aluminum pipe are commonly available. While the ability to weld aluminum is required for fabrication, this should not be a limiting factor given the worldwide distribution of people skilled in the welding trades.¹⁸

Conclusion

The feeder mount described in this paper is inexpensive, relatively-easy to fabricate, and very easy to deploy. It is an effective mount for an electrical feeder at the side of a circular tank and allows for automatic feeder use in conjunction with tank covers.

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Conflicts of interest

The authors declare that there are no conflicts of interest.

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