

Ku-ring-gai stingless beehive retrofit box schematics – supporting information



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1.0 - Introduction

If you are fortunate enough to have one of our newer KOATH hives, then the ugly and somewhat fragile polystyrene cover is a thing of the past. However, for much of the time the program has been running we have relied on OATH hives inside polystyrene boxes. When we changed to our newer hives we wanted to find a way to be able to convert our older, more numerous OATH hives into KOATH and so designed the KOATH Retrofit.

Now, with the development of the updated KOATH, I wanted to create an accompanying Retrofit box that would allow those who had purchased an original OATH hive to, if they wished, convert to the newest hive design.

The retrofit box essentially works as a receptacle for the OATH so that when an OATH is split each half is put into one of the retrofit boxes, and then a standard KOATH half (see Ku-ring-gai Stingless Bee Hive Box Schematics for details) is placed on top. This creates two KOATH hives from the single OATH and removes the need to replace the polystyrene covering.

In this document I will list some aspects specific to the retrofit hive. Many of the points relevant to the KOATH also apply to the retrofit hive however, so I shall not repeat those here. Please refer to the documentation accompanying the KOATH design schematics for more information.

2.0 - The hive

Unlike the KOATH, the retrofits are specifically designed to be bottoms, so, when converting an OATH, the top would need to be inverted and placed into a retrofit half alongside the bottom piece. Inverting a hive during a split isn't anything to be concerned about and the bees quickly adapt to the new orientation.

The retrofit box is constructed entirely of wood and is of the same width and length as the standard KOATH. However, the retrofit hives have a larger internal cavity, which is both wider and deeper than that of the KOATH; this is to allow the OATH box to fit fully inside.

In previous iterations of the retrofit box, the internal cavity was made to the exact dimensions of the OATH, meaning that an OATH half would fit perfectly inside. In theory this is fine, but in practice I found that more often than not the OATH wouldn't fit properly, either because it fouled the edges or sat proud of the rim. This would mainly be because when one splits an OATH to convert it, the box is covered in resin and so, unlike a clean, unused box, it was either slightly wider or deeper due to the addition of this extra material. This material could be scratched off, but even then, the OATH often would not fit properly. The issue of the OATH standing proud of the retrofit box was originally solved through the creation of a spacer box (see the KOATH Hive Assembly Instructions, available on our website), which introduced a recess in the matching top box to accommodate for the uneven lip of the conversion. In the new designs however, the cavity has been made wider and deeper than before, meaning that the OATH half will fit without the need

to create a special top box. Only a few millimetres extra in width and depth was required but this is enough to make a difference.

As with the KOATH, the retrofit box is lined with plywood to eliminate gapping, however this is much thinner (3mm) in order to still allow the OATH box to fit inside. The pine of the base is also thinner than that of the KOATH, measuring 35mm in thickness. This enables the internal cavity to be deeper without significantly increasing the box's overall height and as the base of a standard OATH is 19mm thick anyway, combined, the base becomes thicker than the standard KOATH and so still provides adequate insulation.

3.0 - Limitations

Many of the limitations that apply to the standard KOATH box also apply to the retrofit box (please see the supporting information for the standard KOATH box).

For the retrofit box specifically, it needs to be constructed without splitting bars, else it is not possible to insert the OATH half inside. One option here is to cut split bars separately and then add them once the OATH half has been placed inside the retrofit box. By attaching these to the OATH box itself the bars would still come below the lip of the retro box and so not foul the KOATH half placed on top. The difficulty here is that, a) this must be done whilst the hive is open and so prolonging the hive's exposure, and b) if the hive does not split perfectly evenly (with the brood centrally located) then it may not be possible to add the bars without crushing some of the hive contents; this is best avoided.

4.0 - Options to improve

As with the limitations above, many of the options to improve the standard KOATH also apply to the retrofit box.

One route of improvement for the retro box specifically would be making the front, back and sides out of single pieces of wood. Due to the specific and strict measurements of the retro I was unable to obtain cuts of suitable thickness to create the walls of the box from single pieces in a manner that was cost effective. Therefore, I had no choice but to trim additional lengths of pine and attach them to standard 70mm deep pieces. This is less than perfect as it creates another seam which could become a weak point in the hive and also increases error. Another option is to purchase timber that is larger than the requirements, say 140 X 35, and trim this down to the desired size. Although more expensive, it would mean that the hive walls could be constructed of a single piece of wood, which will not only simplify the construction process but limit the number of seams.

5.0 - Acknowledgements

I would like to offer a big thank you to Tim Bird, a good friend of the stingless bee program, who kindly produced all of the 3D images in the accompanying schematics. Without Tim this project could not have gone ahead, and both his time, skills and generosity are highly appreciated.