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## Pre-Testing of New Hive Technology (Mekonnen/Simeamelak Hive) at Remeda Station, Sidama Zone, SNNPR, Ethiopia

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*Abstract-* This new bee hive technology was designed, produced and pretested as a creative innovation on its structure and convenience for local bee races as we observed on some hives of this technology, they always work circular comb. The data on this particular work was measurements of the hive parts, construction challenges, and, and opportunities of the hive in the workshop, in my opinion there will be many works in near future on refining of hive parts, size, component number and comparative evaluation based on suggested areas and with other local and modern hives.

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# Pre-Testing of New Hive Technology (Mekonnen/Simeamelak Hive) at Remeda Station, Sidama Zone, SNNPR, Ethiopia

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## I. BACKGROUND AND JUSTIFICATION

Ethiopia has the largest bee population in Africa with over 10 million bee colonies, out of which about 4.6 million are confined in hives and the remaining exist in the forest (CSA 2007). Currently, the available bee colonies in Ethiopia are grouped in to five different honeybee populations occupying ecologically different areas: *Apis mellifera jemenitica* in the northwest and eastern arid and semi-arid lowlands; *Apis mellifera scutellata* in the west, south and southwest humid midlands; *Apis mellifera bandasii*, in the central moist highlands; *Apis mellifera monticola* from the northern mountainous highlands; and *Apis mellifera woyigambella* in south western semi-arid to sub-humid lowland parts of the country (Amssalu et al 2004).

Ethiopia is the leader in both bee populations in Africa and in bee product business development. In addition, it far exceeds other African countries in terms of volumes of honey and beeswax harvested and traded, and levels of investment in the formal sector (Aby 2009). Ethiopia produces a total 42,180,346kg of honey per year, of which 40,075,363kg, 467,187kg, and 1,637,796kg are from traditional, transitional and modern hives respectively (CSA 2007). As a result, the per capita consumption of honey is assumed to be 0.57 kg assuming nothing is exported. Eighty-five percent of this honey is locally consumed for the preparation of 'Tej' (a mild alcoholic beverage popular throughout Ethiopia) leaving 15% or 6,330 tons of honey for export. Such an amount of annual honey production in Ethiopia puts the country at first rank in Africa and tenth in world. Ethiopia is also the fourth largest beeswax (3200 tons

per year without considering beeswax wasted in the rural areas) producer after China, Mexico and Turkey (Aby 2009).

In Ethiopia, beekeeping is practiced as tradition, which means that most of the farmers in rural areas have hives. As a result, about 4,688,278 beehives are estimated to be found in the rural sedentary areas of Ethiopia, of which, 4,580,303 (97.7%) are traditional hives, 29,421 (0.63%) transitional hive and 78,554 (1.68%) modern beehives (CSA 2007). About 95% of honey production is harvested by means of local methods from traditional hives (CSA 2007). To solve these problems a number of technologies, techniques and management practices have been undertaken. Of these, introduction, evaluation and popularization of modern bee hives is the one from these hives zender hive is known to be highest in honey production, however the technology design and structure did not optimize the local bee hive for which the local bee hives adopt adjust their nature from wildness starting from their domestication era. Thus this proposal is prepared to solve such problem. The prototype picture is presented at the end of this work.

### a) Objective

To develop new bee hive which is more convenient for local bee races with high productivity and quality of honey.

## II. METHODOLOGY

The thought of the technology, designing, prototype development and materials type and specification was produced by the inventor of the technology, Me, Mr. Simeamelak Mekonnen.

### a) Technology Designing and Model Hive Construction

#### i. New Beehive Technology Design/Structures and Measurements

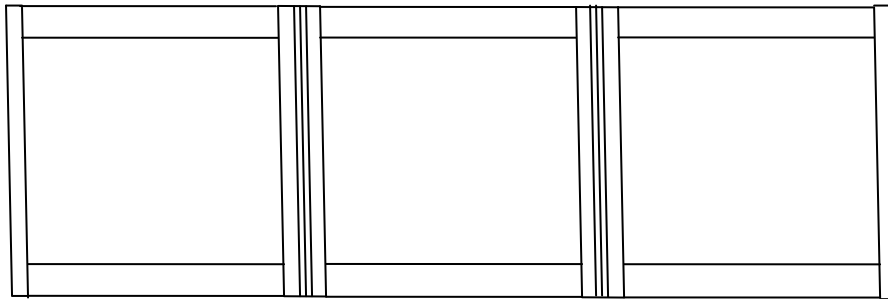
The newly designed hive (Mekonnen/Simeamelak Hive) has a round shape and has three or less distinctly separated sections. Each section has one opening on top side with two fixing bars and two half circled timbers. The bottom part of the section has 10 frames, two frame holder bars, and two fixing bars each at the end of the bottom section. At the joint circle of each section there are one half curved timbers and one

half circled queen excluder attached on the bottom part. The hive externally covered with tine ply wood, and flat corrugated sheet.

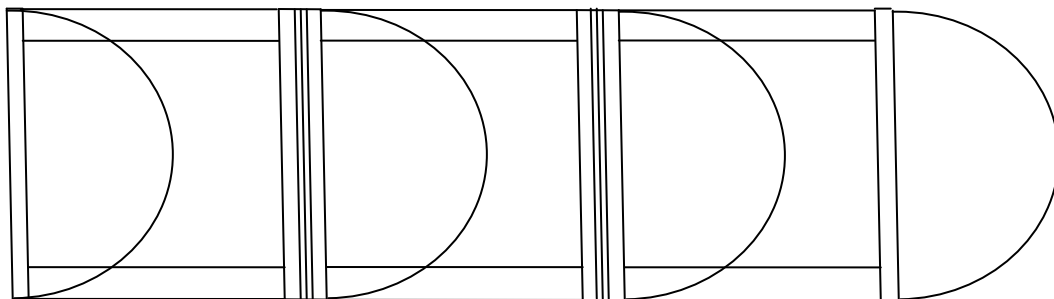
ii. *Model Hive Construction*

After detailed clarification and training the prototype and specification was given to a workshop to produce the model hive.

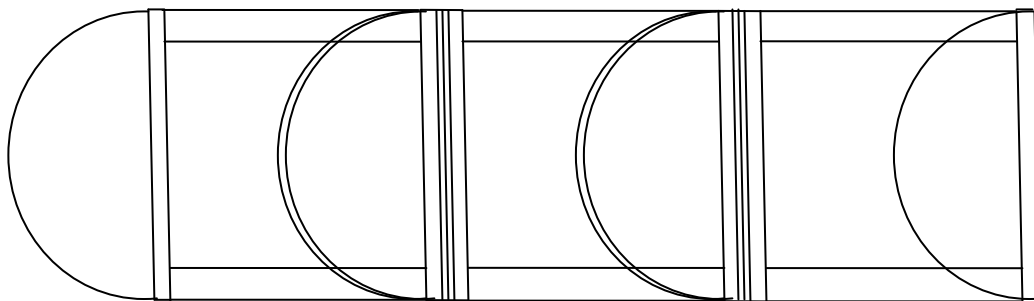
Top view of the main bars of the bottom section



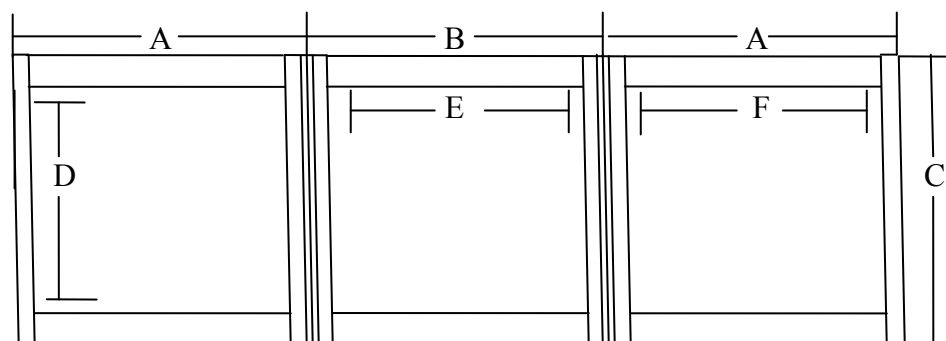
The bottom section with curve structures



The top section with curve structures



iii. *Measures of Each Part of the Hive*



A = 39cm      D = 35cm  
 B = 38cm      E = 36cm  
 C = 42.5cm    F = 34cm

- ✓ Radius of the frame = 18.5cm, width of the frame = 2cm, thickness of the frame = 0.25cm,
- ✓ Radius of half circled frame = 21cm, width of half circled frame = 2cm
- ✓ Radius of queen excluder = 21cm
- ✓ Vertical bars (length = 42cm, height = 2cm and width = 2cm with the thickness of queen excluder for the middle bars)
- ✓ Horizontal bars = (length = 34cm for the end sections and 36cm for the middle section; height = 3.5cm and width = 3.5cm however the width part had inward curve of 1cm at every 3.2cm distance told the frames which have 2cm width.
- ✓ Externally covering materials are 1) chip wood and 2) flat galvanized iron sheet; the bottom part will be

covered with a single chip wood of its length is 116cm, width 67cm and thickness 0.25cm. the upper section have three chip woods of 39cm by 67cm, 38cm by 67cm and 39cm by 67cm, then after the each of the upper section will be covered with galvanized sheet (internally has wood shaving). Galvanized sheet will have additional 3cm length to the outside part and additional covering between the centers of the openings to protect from rain and water leakage

- ✓ The hive has bees landing (4cm by 6cm) and an opening (height = 1cm and width = 4cm) and a door (height = 8cm and width = 6cm).
- ✓ The hive sited on two bars each has 42cm length, 3.5cm width and 2cm height.

iv. *Specific Materials to Construct the Hive*

No.	Items	Quantity	Length (cm)	Width (cm)	Height (cm)	Case
1	ply wood	1	116	67	0.25	For bottom part of the hive
2	Morale (bar)	4	34	3.5	3.5	>>
3	Morale (bar)	2	36	3.5	3.5	>>
4	Morale (bar)	2	42	2	3.5	>>
5	Half circled timber	10	r = 21	-	2	>>
6	Queen excluder	2	r = 21	-	0.2	>>
7	ply wood timber	2	39	67	0.25	For doors
8	Chip wood timber	1	38	67	0.25	For a door
9	Morale (bar)	4	35	2	2	For doors
10	Morale (bar)	2	34	2	2	For a door
11	Morale (bar)	4	12	1	1	Jointer for movable half circled timbers
12	Morale (bar)	2	42	3.5	2	Hive sitter
13	wood timber	30	116	2	0.25	Frame
14	wood timber	30	10	2	0.25	Frame fixer
15	Wire	1	4500	-	-	Printed wax and frame fixer
16	Galvanized smooth iron sheet	2	41	67	-	For doors
17	Galvanized smooth iron sheet	1	40	67	-	For a door
18	Galvanized smooth iron sheet	2	71	3	-	Between doors line
19	ply wood timber	1	8	6	0.25	for bees in and out hole
20	ply wood timber	1	6	4	0.25	bees landing
21	jointer	6	-	-	-	Doors and bottom part fixing
22	Lock	5	-	-	-	For doors and doors line sheets
23	Yellow paint	-	-	-	-	Bottom part
24	Nails	-	-	-	-	On count

v. *Model Hive Construction*

After detailed clarification and training the prototype and specification was given to a workshop to produce the model hive. This new bee hive technology was designed, produced and pretested as the first innovation on its structure and convenience for local bee

keepers as we observed on some hives of this technology, they always work circular comb..

The data on this particular work was measurements of the hive parts, construction challenges, and, and opportunities of the hive in the workshop, in my opinion there will be many works in

near future on refining of hive parts, size, component number and comparative evaluation based on suggested areas and with other local and modern hives. The following pictures illustrate the model hive on front part.

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