

**GUIDELINES TO SET-UP AN EAR MOLD LABORATORY**

**Reg.,No.M9221**

**AN INDEPENDENT PROJECT WORK SUBMITTED IN PART FULFILMENT  
FOR FIRST YEAR M.Sc.(SPEECH & HEARING) TO THE UNIVERSITY  
OF MYSORE.**

**ALL INDIA INSTITUTE OF SPEECH AND HEARING, MYSORE-570 006**

**MAY 1993**

DEDICATED TO  
The Handicapped population  
Respected Babujee  
Dear Dad & Maa and  
my sweet, everloving and  
marvellous brothers

**CERTIFICATE**

This is to certify that the  
Independent Project entitled: Guidelines  
to set-up an Earmold Laboratory is the  
bonafide work done in part fulfilment for  
first year M.Sc., (Speech and Hearing) of  
the student with Reg, No. M9221.

Mysore  
May 1993



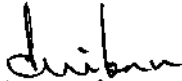
**Director**

All India Institute  
of Speech & Hearing  
Mysore - 570 006.

CERTIFICATE

This is to certify that this  
Independent Project entitled:  
Guidelines to set-up an Earmold  
Laboratory has been prepared under  
my supervision and guidance,

Mysore  
May 1993

  
Dr. (Miss) S. Nikam,  
GUIDE

## DECLARATION

I hereby declare that: this Independent Project entitled: Guidelines to Set-up an Earmold Laboratory is the result of my own study undertaken under the guidance of Dr.(Miss) S.Nikam, Prof, and Head of the Department of Audiology, and Director, All India Institute of Speech and Hearing, Mysore, and has not been submitted earlier at any University for any other Diploma or Degree.

Mysore

May 1993

Reg.No.M9221

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Babuji, Maa and Dad, your silent prayers and blessings have always made things go smooth and easy for me.

Dear Bhaiya and Himee, I missed your criticisms, but your love has always given me encouragement to face hard time.

Salaj, there are no words for your friendship and concern knowing you has given me a true friend.

Jessy, your friendship is my valuable possession. You have always given me a moral support in your own unique and sweet way.

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## INTRODUCTION

Hearing aid without an earmould is like a "man without his backbone".

This is the most simple and emphatic way in which the vitality of an earmould to a hearing aid can be explained.

The earmould forms an integral part of the personal amplification system, extending its influence from fitting of the hearing aid to the acoustic modifications which are beyond the circumscription of the electrical controls of the hearing aid.

It is now-a-days inconceivable to consider fitting of a highly developed hearing aid without using an individual earmold. For the hearing-impaired, the earmold represents the most personal part of his hearing aid, and his willingness to accept the presence of the hearing aid is largely determined by the comfortable seal.

For more than just acoustical sealing the ear canal, the earmould serves to transmit the acoustic tuning of the fitted hearing aid completely and without interference.



Over the years, the earmould system has undergone many modifications in terms of material, instruments, procedure and also the use of various accessories in order to improve upon the acoustics of the output signal of the hearing aid. We now have various commercially available earmould options with the improvement in the mould technology.

**a) Earmoulds then -----and now:**

Hearing is a vital link of man to the communicating world, and the hearing-impaired is robbed of this vital experience. In this quest for a more efficient sound, the field of earmoulds has seen a proliferation of the fitting options within a span of time between 1949 to the present date.

The earliest known custom earmoulds and the options available currently pooled up from the literature are discussed here.

The earliest known custom earmoulds Berger (1981) in a review on the earliest known custom earmould reports: "A few references to the introduction of the custom earmould dates from 1920's or 1930's. The first electric

(carbon) hearing aid employed an earphone and in the 1920's and 1930's, a trend began of replacing the earphones with smaller devices - 'the receivers'. The first receiver used with the electrical hearing aids employed wood or hard rubber eartips, so as to direct the amplified sound into the ear canal more efficiently. The receiver and the eartip were typically held at the ear by a wire which was wrapped over the pinna. Soon custom and stock moulds appeared.

The introduction of custom earmoulds, however, dates back well before the 1920's. Atleast, three confirmed instances of custom earmoulds can be dated before the present century, obviously being used with non-electric hearing devices. The device was invented by Friedrich Wilhelm Aschendorf. The Aschendorf hearing aid cone was made of silver, but whether the earmould was made of silver or of another material was not clear. However, it is clear that a cast was made of patient's concha as the model for the earmould portion.

A second use of a custom earmould dates from about the same time as that of Aschendorf - the Loewe device. This consisted of a lacquered paper mache or metal concha

portion modeled from a cast of the ear concha, with central opening continuous with the auditory canal. Again, the specifics of how the earmould was, are unknown. To the earmould was attached a large, stiff paper disc which fit over the side of the head.

The 3rd pre-20th century use of custom earmoulds were those made as early as 1890 by Thomas Hawksley. The earmould was made by a wax impression of concha and slightly inward into the external canal, by using stents dental modelling. When the impression had been made and excess wax trimmed off, it was coated with metallic powder, and placed in an electrolyte depositing bath of copper sulphate with a bar of copper as an anode. A thin coat of copper was thus deposited over the impression and when it was sufficiently thick the wax melted out and the pure copper surface smoothed and polished.

The first patents for earmoulds were obtained in 1926 by Halsey Augustus Frederick. Frederick patent was assigned to western Electric Co. The same firm

obtained patents for four sizes of right and four sizes of left stock earmoulds soon thereafter.

This called for an earmould made for gutta-percha, rubber compound or plastic. It was suggested that the material might be made to resemble the flesh of the user; though flesh coloured earmoulds were made only after 1940's.

Dentistry played an important part in the manufacture and perfection of custom earmoulds. The S,S.White firm made the earliest known custom earmoulds for use with electric hearing aid. Efforts to improve custom earmoulds as well as to describe their acoustic effect on the amplified signal were made by Mayer, Schier - dentist in New York. Other pioneer manufacturer of custom earmoulds were Muir Inc., of New York, Justi and Sons, Inc, of Philadelphia and the Sonotone Corp."

At present, the recent trend also evidences the demand of the custom earmoulds by the patients. It is preferred by the patients over the standard moulds or eartips due to following advantages.

1. The most accepted mould is the one which gives the wearer best wearing comfort and custom mould provides good comfort over the stock moulds or the tips.
2. Acoustic output ie. the performance with custom moulds is improved rather than with other moulds/tips.
3. Retention ability is good with custom moulds.
4. Custom earmoulds are made according to each individual's needs and shape and size of the ear.

**(b) Earmould nomenclature:**

The National Association of Earmoulds (NAEL) in 1970 proposed a system of classification dealing with the nomenclature of specific landmarks of the earmould and a system dealing with the specifications of the earmould types.

In addition to those included in the NAEL classification system, the different styles of earmoulds based on the anatomical landmarks and physical characteristics of the earmoulds are discussed briefly.

Description of earmould style:

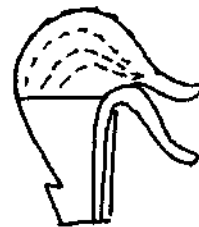
Standard: Used In the fitting of body type aids can be designed to fit any size receiver. It permits the maximum passage of sound when the receiver is snapped directly into the earmould.



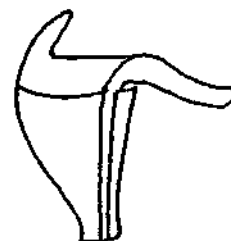
Skeleton: A very popular type of Invisible mould. It features concealment, lightness of weight comfort and excellent retention.



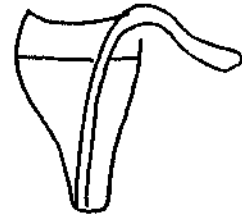
Shell; Carved and uncarved sculpturing. Designed for hearing losses that are severe to profound. Provides a better acoustic seal, maximum strength and comfort.



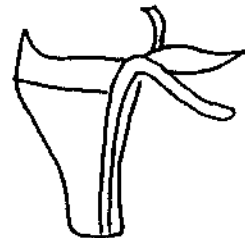
Canal lock: It is very light in weight and offers the ultimate concealment providing there is sufficient retention in the anti-tragus area.



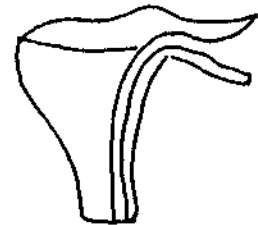
Canal tip: Excellent concealment and customer satisfaction is achieved in this most inconspicuous design.



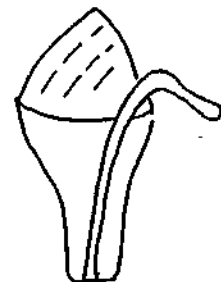
3/4 skeleton: Same as the skeleton earmould but has part of back ring removed. This provides comfort if the ear is tender or comprised of hard cartilage.



Semi skeleton: Has all the back ring removed thus providing extra comfort for patients who have tender ears.



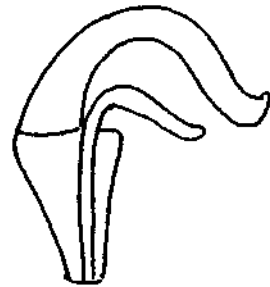
1/2 shell: In between a semi-skeleton and canal lock. Excellent retention if patient has ears which are tender or comprised of hard cartilage.



3/4 shell: Designed for patients who needs a good acoustic seal but has trouble with insertion of helix region.



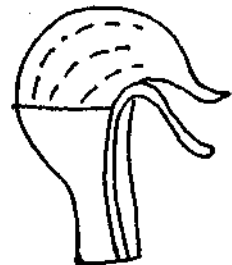
G-Mould: An open mould fitting with half canal and middle of concha region cut away. Available with long or short canal.



Ear plug; Excellent idea for people troubled with water and noise\* Ideal for children with grommets in their canal.



Ultra carved shell: The whole concha region of earmould is sculptured away leaving minimum 2 mm thickness excellent concealment and light in weight suitable for severe to profound hearing losses.





As the personal part of hearing aid. The earmold must be possible to wear, and not cause irritation or allergies, neither must it lead to inner pressure in the ear.

....and how these expectations are met:

These expectations are met in an earmould lab:

1. Anamnesis
2. Examination of external ear and its canal
3. Acoustic aspects of applied hearing aid
4. Selection of earmould style
5. Selection of earmould material
6. Preparation of the external ear and its canal
7. Impression technique
8. Manufacturing of earmould
9. Earmould modification of frequency response of the applied hearing aid,
10. Earmould insertion and training the client.

The individual work processes are described as:

(1) Anamnesis: This is the preliminary interview with the client. Alongside general enquiries as to age, habits, work conditions and medical care, the following further information should also be obtained:

- a) The pathological past and the current condition of the hearing loss from the point of view of the client and in relation to his environment.
  - b) The sensitivity of the external ear during cleaning or if the auditory canal comes- into contact with foreign bodies.
  - c) Indication of dry, wet or even liquid ear wax formation.
  - d) Existing allergies to certain substances.
  - e) In clients already fitted with hearing aids, previous experience in wearing earmoulds.
- (2) Examination of the external ear and its canal:

The nature of the ear tissue is extremely important in taking impressions.

In the young, the external ear possess a strong cartilage and a taut connective tissue. With increasing age or a weakening constitution, it is possible for this tautness to give way to extreme elasticity of the skin. Testing by palpating the pinna also permits conclusions as to the nature of the tissue of the auditory canal.

b) Visual examination:

This is carried out using an otoscope and ear light.

The otoscope: It is an instrument of medical diagnosis permitting exact examination of the auditory canal through to the ear drum by means of concentrated illumination and magnification (1.5-2.5 fold). Examination using the otoscope provides information on the shape and contours of the external ear and canal and the presence of any problems such as wax, enlargement, trauma, disease and condition of the ear drum. Perforations of the ear drum can also be diagnosed.

The ear light; Is the light equipped with a 3 mm long, extremely thin spike. In contrast to the otoscope, the earpermits recognition of the length, direction and diameter of the canal and the size of the impression to be taken. For this reason, these two instruments complement each other and must be used in conjunction.

(3) Acoustic aspects of applied hearing aid:

The main purpose of the earmould is still to provide feedback free transmission of sound from the hearing aid to the eardrum. This means that increasing acoustic

amplification necessitates a higher seal by pressure of the earmould against the wall of the auditory canal. However, we know that an earmould positioned without contact pressure in the ear is the most comfortable for the client. The greater the contact pressure, the greater the sensation of foreign body in the ear.

For this reason, an efficient earmould may not be permitted to generate more pressure than absolutely necessary to feedback free transmission of sounds. This basic principle and examination of the tissue are the many factors to be considered in deciding which impression making method to use.

(4) Selection of earmould style;

The style of earmould does not, in fact, basically affect the seal. The sealing cone lies in the area of the entrance of the auditory canal. In the main, the shape of the external ear determines the choice. In contrast to the shell, the skeleton style offers the advantage of improved ventilation of the ear. In the case of silicone earmoulds, the shell form is preferable due to the properties of the material.

(5) Selection of earmould materials:

Hard acrylic earmoulds:

Rigid material is the most commonly used currently. Its advantages consist in good support for the hearing aid, cleaning efficiency and, importantly, also its appearance. The high level of transparency permits adaptation to skin colour in question. Earmoulds made of rigid material are also easiest to fit in the ear.

The disadvantages involved here are the foreign body sensation, and frequently occurring pressure sores. During chewing and speaking movements, the highly polished earmould is more easily able to slip out of position and, in more powerful hearing aids, can lead to feedback.

Soft earmoulds:

These flexible earmoulds are produced from silicone rubber. Due to their flexibility, they are able to adapt to every movement of the auditory canal, and their anti-slip surface means that they stay firmly in place. This advantage makes itself felt particularly where more powerful hearing aids are being used.

In some cases, an excessively firm fit can have a negative effect. Warm, humid air can become trapped in the area between the earmould and the ear drum, leading in some cases to irritation of the tissue. This irritation is frequently incorrectly described as allergy. A parallel vent can remedy this situation. The anti-slip effect of the material is particularly beneficial in straight or conical auditory canal. To avoid the risk of injury to auditory canal especially in children, while playing or taking part in sports, a soft earmould is preferable to a hard one.

Preparation of external ear and its canal:

When the examination has shown that the auditory canal is clear, preparations for making the impression can be started.

Impeding hair growth in the sealing zone area is removed using round scissors. Loose particles in the anterior auditory canal can be removed using otofix forceps, dazzle-free forceps with safety tips. Hair from the head covering the external ear is held back by hair clips.

An important step is the plugging of the auditory canal. As a rule a foam pad, to which a thread is

attached, is placed in the canal, to beyond the second bend. This protects the ear drums lessens the air lock which is created in as the impression is being made. The foam pad is first placed in the auditory canal with the otofix tweezers and then eased into the correct position with the rod of ear light.

Impression technique:

The basis of any superior earmould is the ear impression, which must precisely reproduce the whole ear canal and the concha. It must also create sufficient adaption to the skin of the ear canal, but no more than absolutely necessary to achieve an acoustic seal of the variety of different hearing aid gains. Unnecessarily high adaption reduces the degree of comfort of the earmould for the wearer. The taking of the ear impression should be executed without complications. The completed impression should retain its shape and elasticity.

In order to achieve a bubble-free, well fitting impression, use of the impression syringe is essential. Before making impression the attendant has to take note of gain and acoustic properties of the selected hearing aid.

Modification of the acoustic properties:

The acoustic -transmission of the sound spectrum of the selected hearing aid can be influenced by the earmould and this has to be taken into account in the adjustment of the acoustic properties. These modifications can be done in terms of -

- a) Tubing diameter
- b) Tubing length
- c) Length of earmould canal
- d) Bore diameter
- e) Bore length
- f) Select-A-Vent

Fine adjustment and training the client:

In spite of all the precautions while taking the impression and the careful manufacture of the earmould, subsequent adjustments are often unavoidable. Especially the placing of the earmould into the ear often causes the client certain problems. In most cases shortening and rounding off of the attaching elements make this easier.



A considerable part of success of a good adjustment of a hearing aid depends on the wearing comfort of the earmould.

Earmould insertion and training the client - is provided in order to make sure that the proper fit is attained.

SETTING UP OF AN EARMOULD LABORATORY

The crucial role of an earmould in the hearing aid system justifies the need to set-up an earmould lab.

Earmould lab does not play its role only in catering the needs of existing hearing aids but also for training and research purposes. Various researches can be carried out in order to modify the acoustic characteristics of a mould and benefit the hearing aid wearer with even better output.

Moreover in a country like ours where in the estimate of hearing handicapped is relatively more, we need to set-up more laboratories to meet the demands of the needful population.

Setting up an earmould laboratory with minimum requirements:

While setting up a lab. the first question comes up is where to set up a lab?

Earmould lab can be set-up within an institute or it can be a separate laboratory. The lab can be a single or in a two room situation.

Since the aim of the project is to set-up a minimum requirement lab. The lab can be a one room situation with the dimensions of 12 mts and 4.5 mts.

Lab. maybe divided into various sections for different phases of earmould process. The separations may be done using cardboard or plastic partitions.

These partitions should include space for -

- waiting and registration
- impression and plastering
- packing and curing
- drilling
- boring
- polishing and finishing
- fixing of rings and  
a space for staff.

Staff: The staff members should include -

- One B.Sc., (Speech and Hearing)
- Minimum of two technicians (depending upon work load the number may be increased)

The technicians should have undergone a training period.

Salary: Confirming to the state or the central Government.

If facilities permit a hearing aid trial room may be attached to the lab with the dimensions of 6 mts x 2 mts.

This will not only help to ensure the adequate fit but any acoustic modifications required may be done when suggested.

The requirements of the earmould lab. for a minimum set-up has been tabulated as below:

Items	Quantity	Purpose
1. Otoscope or pentorch light	1	For examination of the ear.
2. Cotton roll	1	To block the ear canal.
3. White cotton thread	1	To tie the cotton ball.
4. Plugger	2	To insert the cotton in the ear canal.
5. Measuring cups	2	For measuring water.
6. Algenate impression material large	1	For taking the impression (due to technical problems this should not be stored for more than one year since the date it is manufactured)

Items	Quantity	Purpose
7. Rubber bowl (small)	2	For mixing the impression material and measured water.
8. Plaster spatula	2	To mix the impression material and also used during flasking.
9. Brown paper sheets	12	For injecting the impression material
10. Earmould flask	10	For processing the impression of the ear taken to make the mould.
11. Rubber bowl (big)	2	To mix the plaster.
12. Plaster knife	2	To cut the extra plaster in the flask.
13. 450 ml. cold mould seal	2	Separating media.
14. Black brush	2	To apply the separating media.
15. Plaster of paris	3Kg.	For flasking and curing the mould.
16. Vaseline bottle	2Kg	To apply to the flask before pouring plaster of paris.

Items	Quantity	Purpose
17. Diamond shape carver	3	For extracting the impression.
18. Probes double	2	For extracting the impression.
19. Wax knife	2	For extracting the impression.
20. Stellan clear complete.	1 packet	For filling the flask.
21. Clamps	4 each	For pressure treatment.
22. Press spring loaded.	2	For pressure treatment.
23. Spanner (adjustable)	1	For pressure treatment
24. Variable thermostat hot oven or heaters.	1	For curing the earmould
25. Surgical hammers	3	To remove the cured mould from the flask.
26. Dental lathe. 1/4 H.P.	1	For preliminary shaping and trimming.
27. Hanging motor with H.P. lab. (hand piece, 10,000 R.P.M)	1	For trimming and drilling

Items	Quantity	Purpose
28., Ruby trimmers	2	-
29., Straight hand piece Mandrils	1	-
30.. Vacanite burr	8	For making canal hole, depending upon the size of the canal.
31. HP S/S burrs	2 packets	For making canal hole, depending upon the size of the canal.
32. Empty boxes for keeping burrs	1	To avoid the wear and tear of burrs.
33. Earmould rings	200	Rings act as coupler between the earmould and hearing aid.
34. Soldering iron rod with stand.	1	For fixing the rings.
35. Cement spatula	2	To remove the impression material from the flask.
36. Acrylic powder	3 Kgs.	To make the earmoulds.
37. Dappen glass	2	To mix the acrylic.
38. Cross liquid (450 ml)	20 bottles	

Items	Quantity	Purpose
39. Pumice powder	<b>2</b>	For polishing
	packets	
40. Chip blower	2	For repairing and cleaning.
41. 6" straight scissor	2	-
42. Dust protectors	1	Protective measure for mouth and nose when working.
43. Tray	1	
44. Kidney tray	1	
45. Push scaler	2	
46. Mounted finishing points assisted numbers	10	
47. Johnson's ear buds(100 pcs).	1	To clean the ear canal
48. Ball burnisher	2	
49. Lathe stone (Grinding)	1	

NOTE; Due to variations in prices and tax in various states, the exact amount to start a full fledged Earmould Lab is difficult to state, but an estimate of around Rs.16,500/- would be sufficient to start with (excluding the furniture and space). The above consumable material would be sufficient to prepare 100 earmoulds.



FOREIGN PRODUCTS

Earmould technology -" The recent trend in vrious countries".

The leading countries dealing with the earmould technology are Germany,U.S., Australia and the trend in these countries is quite advanced. The following are the products available in these countries.

Materials..

Soft

Otoform - A/soft  
Otoform - K & special  
as well as otoform T&F  
Otoacryl soft/60, liquid  
Soft (vinyl)  
Flexible  
Soft acrylic  
Mediflex  
M.D.X.  
Soft adcomold

Hard

Otoacryl G/40 hard  
Hard  
Hard body, flexible canal  
Hard acrylic  
Biopor  
Hard adcomold.

\* The above materials can be used under specified environmental conditions.

Basic earmould styles:

The least mould is the best mould.

- |                 |                                   |
|-----------------|-----------------------------------|
| 1. Receiver     | 11. Non occluding                 |
| 2. Skeleton     | 12. Non-occluding w/extension     |
| 3. 3/4 skeleton | 13. Non occluding W membrane and  |
| 4. 1/2 skeleton | extension                         |
| 5. Canal        | 14. Unique fitting                |
| 6. Canal 1/3    | 15. Open type stock mould         |
| 7. Canal 2/3    | 16. Non-occluding stock mold      |
| 8. Shell        | 17. Contoured non occluding stock |
| 9. 3/4 shell    | mould.                            |
| 10. 1/2 shell   |                                   |

Special purpose earmould styles:

- Anesthesiologist
- P.P. Hanger
- Float plugs
- Noise plugs
- Noise plugs with cords
- E.A.R. foam plugs.

Modular earmould styles:

- |                  |                     |
|------------------|---------------------|
| - Modular shell  | - Modular 1/2 shell |
| - Modular coffin | - Modular canal.    |

Acoustically tuned earmoulds:

- 6R12
- 6 AM
- 8 CR
- 6 BO
- S B 5
- 6 B 10
- 6 0 5

Modifications to earmoulds:

- No helix
- Feedback suppressor
- Tragus
- Non-allergic
- Mandibular modifications
- Cavity vent moulds
- Pin hole cavity vent
- Small cavity vent
- Sound channel cavity/cavity mould
- Pin hole cavity vent with damper
- Notch filter earmoulds
- Helmholtz resonator
- Closed branch tube
- Variable vent stock canal mould
- Variable vent stock hydramould
- Plextone custom style stock mould
- Conventional stock earmould
- Optimold
- EXPAN earmould.

Venting for earmoulds:

- Parallel
- Diagonal
- High frequency (select-A-Vent)
- Positive venting valve
- Open vents
- **Open skeleton**
- **Y-vent**
- **External vent**

\*Venting sizes available - 1 mm; 1.5 mm; 2 mm; 2.5 mm  
3 mm and 4 mm

Bore modifications of sound channels:

- Bell bore
- Large bore
- Open bore
- Step bore
- Standard bore .076
- 1/2 bored cut.

Tips and adaptors:

- Testing tips (Lucite-Hard, Skintex-soft)
- No mold fitting tips
- Universal tip

- Pliable universal tip
- Filter insert canal tip
- Flexi canal tips
- NU-Fits
- Half moon attachment
- Quarter moon attachment
- Sonotone receiver adaptor
- Adapta tube
- Receiver adaptor
- Receiver extension adaptor
- Curved elbow fitting

**Couplers:**

- Over ear coupler
- Threaded coupler
- Tubing coupler at 135° angle.
- Tubing coupler for eye glass aid.
- Hearing aid test coupler connector.

**Attenuator:**

Rotary attenuator

- Earmould kits
  - Earmould box
  - Pocket box
- **Working cases and kits**
- **Plastic/steel earmould rings.**

INDUSTRIAL SAFETY;

Especially in the laboratory protective measures are necessary like (a) eye protectors (b) mouth and nose protectors (c) hand safe foam spray. When working with resins, polishing, processing of synthetic materials developing fumes.

SPECIAL TOOLS:

Particularly for the laboratory, they are always required for the special techniques; that have been mentioned;

1. Wore knife - small and large
2. Modelling knife
3. Large mixing spatula
4. Small mixing spatula
5. Dipping instrument
6. Impression lifter
7. Angled tweezers
8. Bayonet tweezers
9. Clamping tweezers
10. Scalpel
11. Tubing expander
12. Piston - for insertion of heated mould rings-

13. Plaster knife
14. Plaster pliers
15. Mixing spatula for plaster
16. Steel scissors
17. Expanding coupling instruments
18. Tubing loop
19. Core drill with tubing threader.
20. Large impression injection syringe.

TECHNIQUE MACHINES:

For treatment and finishing works of different kinds of synthetic material, repairs etc. a special technique machine is required. Thus, such a machine represents an acquisition for permanent use. Various systems offered are:

1. Kavo HF-SF 5000-60,000 r/min.
2. NOUVAG NM 3000
3. KAVO - K9 machine
4. KaVO - K10
5. HaDeWe
  - Micromotor machine
  - Kavo flexible drive
6. Kavo technical hand piece
7. HaDeWe technical hand piece

DRILLING AND CUTTING TOOLS:

All tools fit into the hand pieces belonging to the technical machines and have a shank diameter of 2.35 mm.

Drilling and cutting tools for the acrylic technique:

1. Ball burr's of different diameters (1. 2, mm to 2, 7 mm)
2. Cutter's of various shapes.  
Oval, globular, pear shaped; conical, pointed cone, head shaped of various diameters.

**Special burrs and cutters for BIOPOR technique:**

1. Burr's of diameters 1,6 mm - 2,3 mm
2. Cutters of various shapes.  
Pine globular shaped - 7,0 mm  
Oval small shaped - 5.0 mm  
Oval medium shaped - 7.0 mm  
Oval large shaped - 8.9 mm  
Cylindrical shaped small - 4.0 mm  
Cylindrical shaped large - 7.0 mm  
Pear shaped small - 6.0 mm

SPECIAL FINISHING TOOLS:

1. Cutter, square shaped for cutting plastics
2. Sandpaper holder
3. Drill, fine spirales (0.5 mm - 0.9 mm)
4. Twist drill (0.6 mm - 1.6 mm)



5. Drill short spirales (2.00 mm - 2.3 mm)
6. Hard metal cutter to fix mould rings.
7. Seating burr for mould - 4 mm
8. a) Seating burr for acrylic - 4 mm  
b) Seating burr for Biopor - 4 mm
9. Finishing stone, conical shaped - 7.0 mm
10. Finishing stone, plate shaped - 8.5 mm
11. Mandrel - 5 mm
12. Wheel brush
13. Polishing buff
14. Brush - cup shaped
15. Abrasive stone
16. Polisher rubber
18. Magnetic burr holder
18. Plastic box
19. Corundum
20. Sand paper.

MACHINES FOR THE LABORATORY:

- **GELOMAT6** - A large automatic unit to prepare gel masses and to keep them at constant temperature.
- **GELOMAT1** - A small automatic gel unit for melting gel and to keep it at constant temperature.

- DOSPER-M - An automatic unit for dosing, mixing and dispensing, by means of a mixing canula.
  - DOSPER-MP - Similar to above unit, in addition it is pneumatically operated for processing of thick masses.
  - Electronic - warning and vulcanisation oven.
  - Vacuum mixing unit
  - PNEUPRESS - For curing under pressure, guarantees plaster forms without air bubbles.
  - Polishing motor
  - Polish protection
  - Microwave unit
  - Horizontal face grinder
  - Small grinding motor
  - Electric vibrator.
  - Small vibrator
  - Spindle press
  - Pneumatic chisel (to batter plaster)
  - Electric heating iron (to insert ring)
  - Large illuminated magnifying glass (for control works etc)
  - Timer
  - Ventilette "Monsun" (for mains supply 220v)
  - Horizontal injection molding machine for processing different thermoplastic resins in special aluminium cartridges.
  - Automatic boiling - out units
- LABORMAT - SD
- LABORMAT - TH.

**RECOMMENDATIONS**

**(For Indian set-up)**

1. All Deaf Schools should have their own lab. facilities not only for the manufacturing of the moulds but also for the required acoustic modifications.
2. All DRC<sup>1</sup>s and RRTC's should have their own lab.
3. Mobile labs, may be installed and also a use of earmould kits can be employed for manufacturing instant earmoulds.
4. A simple waterbath can be used as a polymerization unit.
5. A minimum set-up can carry the steps till plaster casting and then shift to the nearby equipped lab. for further processing.
6. Hearing aid dispenser can have their own attached earmould lab to ensure the proper fit.
7. More training programmes should be intituted.
8. Research in the field of earmould technology should be enhanced.
9. Ear protective devices may be dispensed in a minimum set-up.

APPENDIX

Addresses of the firms which supply the most of the materials in our country.

BOMBAY:

1. Associated Dental and Medical Supply Co.  
27, Yusuf Building,  
D.N.Road  
Fort, Bombay - 400001.
2. Patel and Sons  
249, D.N.Road  
Fort, Bombay - 400 001.
3. Indian Dental Traders  
3 warden court  
August Kranti Marg  
Bombay - 400 036.

MADRAS:

- 1. Indo-ceylon Dental Supply  
Near Flower Bazar  
Madras - 600 001.**
- 2. The Standard Dental Supply  
Madras - 600 001.**

BANGALORE

1. United Dental Supply  
Sajjan Rao Circle  
Bangalore - 560 004.
2. D.K.Patel and Sons  
172, Narasimha Raja Road  
Bangalore 560 002.

DELHI

1. Seth Bros and Co.  
Dental Depot  
954 Qabul Attar  
Behind Railway Booking Agency  
Chandani Chowk  
New Delhi 110 006.

2. Unident India Ltd.  
New Delhi - 110 005.

CALCUTTA:

1. Modern Dental Department  
51 Sitaranjan Avenue  
Calcutta - 12.

AHEMEDABAD

1. Suzil Dental Corporation  
69/A Uttar Gujarat Audyogic Vasahat  
Narmada Road  
Ahmedabad - 25.

\* The Indian Dental Traders, Bombay are the supply agents.

\* Overseas Addresses may be contacted if need arises for technical literature about the foreign products, or for Import of required accessories etc.

1. Export Price list  
Kavo Elektrotechnisches Werk  
Wangener StraBe 78,  
P.O.Box.1320  
D-7970 Leutkirch im Allgau-1  
West Germany.  
Telephone - 07561/860  
Telex - 7 32426  
Telefax - 07561/86222.

2. Frisch Labor System  
GmbH, Lenzhalde-4,  
D-8999 Oberreute, W-Germany  
Telephone (08387)2200  
Telefax (08 387)3230

3. **Teruen Prosthetics Pty.Ltd.**  
2nd Floor  
77-Castlereagh street  
Sydney N.S.W.2000  
Australia.

- 4. Dreve Otoplastik GmbH**  
**Max-Planck-Straße**  
**D-4750 Unna/Germany**  
**Telephone (02303) 88070**  
**Telex 8229295**  
**Telefax (02303) 82909**
- 5. ADCO Hearing Conservation, Inc**  
**7310 S, Altonway, Suite A,**  
**Englewood, Colorado 80112**  
**U.S.A.**  
**Telephone - 303-290-8339**  
**Telefax - 303-290-0405**
- 6. Eveready Plastics**  
**Atlanta Division**  
**Post Office Box 566**  
**Forest Park**  
**Georgia 30051-0566.**
- 7. HALHEN Company**  
**36-14 Eleventh Street**  
**Long Island City**  
**N.Y.11106**  
**Tel: Exeter 2-6020-6021.**

SOURCES

The information has been compiled from the following catalogues:

1. **HEL-HEN catalogue**
2. **Eveready Plastics (ATLANTA DIVISION)**
3. **ADCO PRODUCTS CATALOGUE**
4. **Dreve Otoplastik(Katalog No.6)**
5. **Dreve Otoplastik-Product**
6. **Interson TARIF-89**
7. **Frisch Labor Systems (CONTACT)**
8. **Ternen Prosthetics.**