# SURVEY OF OPTOMETRISTS UTILIZING IN HOUSE OPTICAL LABORITORIES

by

David Daniel Bush
Brianna Lynn Gayda

This paper is submitted in partial fulfillment of the
Requirements for the degree of

Doctor of Optometry

Ferris State University
Michigan College of Optometry

May 2011

# SURVEY OF OPTOMETRISTS UTILIZING IN HOUSE OPTICAL LABORITORIES

by

David Daniel Bush
Brianna Lynn Gayda

Has been approved

May 2011

ACCEPTED:

_____

Faculty Course Supervisor

Ferris State University
Doctor of Optometry Senior Paper
Library Approval and Release

SURVEY OF OPTOMETRISTS UTILIZING IN HOUSE OPTICAL LABORITORIES

I, David Bush, hereby release this paper as described above to Ferris State University with the understanding that it will be accessible to the general public. This release is required under the provision of the Federal Privacy Act.

Ferris State University
Doctor of Optometry Senior Paper
Library Approval and Release

SURVEY OF OPTOMETRISTS UTILIZING IN HOUSE OPTICAL LABORITORIES

I, Brianna Gayda, hereby release this paper as described above to Ferris State University with the understanding that it will be accessible to the general public. This release is required under the provision of the Federal Privacy Act.

## ABSTRACT

*Background*: It is well accepted that optometry practices that utilize an "in-house" laboratory regularly show better financial welfare as compared to offices that do not. However, we have never been presented with specific numbers showing the degree of financial profit, nor the extent of orders processed through a typical "in-house" lab. The aim of our project is to gain a better understanding of how practical and economically beneficial an "in-house" fabrication laboratory is for the private practitioner, as well as to determine the necessary equipment, staff, and inventory to set up such a laboratory.

*Method*: In order to collect this information, a comprehensive "in-house" laboratory survey will be developed and then sent to doctors who are known to have "in-house" laboratories. The survey will consist of thirteen short answer questions regarding equipment, staff, order demographics, and other pertinent information. Upon receiving the completed surveys, the information will be analyzed and compiled in to a document that will be useful to for practitioners who are contemplating the idea of an "in-house" lab.

ACKNOWLEDGMENTS

Jamie Brady
Harbor Optical

TABLE OF CONTENTS

LIST OF TABLES

## Introduction

Optometrists may be nervous to take on the startup expenses of an "in-house" lab when they do not have a clear picture of the profitability. In general, it is a widely accepted thought that optical practices with "in-house" laboratories show better financial wealth; however, the extent of this value remains unclear.

Cutting lenses has become progressively more automated with the development of smaller machines capable of more work. These machines, such as patternless lens edgers, are now more realistic than ever for an "in-house" laboratory setting because of their size and ease of use. It takes a skilled optical technician to run the orders through the production process in order to yield a high quality product. In the optical industry, like other manufactured goods, a poorly constructed product reflects negatively on the business. With the right equipment and a trained technician, a private practice is well on its way to producing its own quality spectacles.

The aim of this project is to gain a better understanding of how practical and economically beneficial an "in-house" fabrication laboratory is for the private practitioner, as well as determine the necessary equipment, staff, and inventory to set up such a laboratory.

## Method

Research in areas related to "in-house" laboratories, or even spectacle production in general, is extremely limited. In order for us to collect pertinent information we must contact several people in the field through survey and written correspondence. The

survey, viewable in appendix A, consists of thirteen short answer questions regarding equipment, staff, order demographics, and other relevant information. The recipients of the survey include doctors and opticians who are familiar with the workings of the "in-house" fabrication lab in their office. Additional contacts through email and interview helped us to gain specific knowledge on lens stock, lens blanks, pricing, and added valuable information.

Further research is required in the areas of equipment and material pricing. For this effort, we aim to find the most current market value of essential and accessory merchandise. Optical supply companies, internet classifieds, and online marketplaces make up some of the resources used to gather this information. From there, a cost analysis is done taking into consideration the condition and availability of each item. The collected information is compiled and analyzed in this document for practitioners to use when contemplating the idea of an "in-house" lab.

**Results**

The survey information collected gave incite on how in-house laboratories are currently functioning throughout Michigan. The following is information was gathered from responses to the survey displayed in appendix A. All labs surveyed have been up and running for at least three years. Some offices found profitability to be best when working with single vision lenses without extra coatings to avoid costly mistakes. Others edge most materials including plastic, polycarbonate and hi-index. Glasses lens jobs in general seem to be avoided in the in house setting.

Based on all survey responses, an optician is hired to execute the lens edging. Frequency of this operation depends on the size of the practice and the average number of jobs per week. It is a common practice for offices to have an optician working with patients fitting and adjusting glasses during the day and then edging lenses part time. Often this is during down time throughout the day or in scheduled periods throughout the week. Although the make and model of tools varied from office to office, the equipment viewed as essential was often consistent. These instruments primarily included a blocker, edger, and hand stone. The number of jobs finished per week varied from about 10 to 50. This accounted for anywhere between 10% and 95% of the offices total weekly jobs, indirectly showing the size of each individual practice. Insurance mandated jobs, as well as specialty orders such as glass, drilled rimless, safety and sportswear, are typically sent to outside laboratories.

Finished lens prices were anywhere from $1.00 to $40.00 depending on the sophistication of the lenses. Most practices refrain from keeping a lot of lens stock on hand. Lenses can be ordered and received in just a few days which can save the practice money in inventory expenses. When lenses are kept on hand, they are often stocked in plastic or polycarbonate, spherical single vision lenses in the most common powers only. As far as tinting goes, participation is split among in-house laboratories.

Overall, practices that participate in in-house laboratories do so at a level that is both profitable and realistic for their individual economic situation. It appears that this can be accomplished with a lot of variability in number of jobs per week and percent of total

jobs done in-house. Necessary equipment and lens stocking strategies tend to be similar in different practice settings. In-house lab strategies for profit are ever-evolving and need to be tracked and altered accordingly to achieve optimal results.

**Discussion**

Over the course of several years working in and around optometric fabrication labs, we have come to the realization that an "in-house" lab is practical, but is it feasible? The aim this discussion will be to outline exactly what an optometrist would ***need*** to purchase in order to have an operational fabrication lab, as well as a detailed description of ***optional*** equipment that would likely enhance the scope, and likely the profit margin, of the "in-house" lab. Prices of all equipment have been thoroughly researched and can be found in a more concise list in Table A. At the end of this discussion, our conclusions will be stated, but it is in the best interest of each individual reader to draw his/her own conclusions about the feasibility of an "in-house" lab as it pertains the his/her current or future financial situation.

**Table A – Optical Lab Equipment and Median Cost**

| Equipment | Cost |
|---|---|
| Block Pliers | $18.00 |
| Blocking Pads/Adhesives | $100.00/2000pc |
| Blocks | $4.25/pc |
| Frame Warmer | $248.00 |
| Gradient Machine | $270.00 |

| | |
|---|---|
| Grease Pencils | $8.00/12pc |
| Handstone | $367.00 |
| Lens Clock | $84.00 |
| Lens Groover | $420.00 |
| Lensometer | $700.00 |
| Nosepiece Set | $4.00/50pc |
| Optical Screw Kit | $100.00 |
| PAL Identifier Cards | $0.00 |
| Patternless Lens Edger | $13,000.00+ |
| PD Stick | $2.00 |
| Pliers Set | $18.00/pc |
| Screwdrivers | $8.00/pc |
| Tinting Apparatus | $700.00 |
| Trays | $2.00/pc |
| Ultrasonic Cleaner | $55.00 |

In order to outline the essential pieces of equipment necessary to completely produce a typical pair of eye glasses, we will take a step-by-step textual tour through the fabrication of a non-complicated, single vision pair of lenses. The job will be broken down into three stages: 1) layout; 2) edging; and 3) assembly. Bolded words are considered essential pieces of equipment. A list of equipment deemed necessary for the most basic "in-house" lab can also be found in Table B.

**Table B – Necessary Optical Lab Equipment**

| Equipment |
|---|
| Block Pliers |
| Blocking Pads/Adhesives |
| Blocks |
| Grease Pencil |
| Handstone |
| Lensometer |
| Patternless Lens Edger |
| PD Stick |
| Pliers Set |
| Screwdrivers |

It is important to note that before any work can start, the optician must receive the two lens blanks in the correct power, as well as the frame of the patient's choosing. For simplicity, we will assume that the lenses are ordered through a lens manufacturer such as Lenstock, and the frame was taken directly from the office's frame board. A complete lens inventory is not an essential for an "in-house" lab. Since the practical amount of lenses that an individual practice would need to have on hand is so variable based on the practice size, readers will need to research similar-sized practices in order to come up with an accurate estimate as to the cost of stocking lenses. There are also numerous types of edging apparatuses. For the sake of this paper, we will discuss a slightly older model edger/tracer apparatus. The reason for this choice is that it is much cheaper than the new, state-of-the-art edgers, and in our opinion, is more practical for an "in-house" lab.

Once the lenses are received, the layout process can begin. A skilled optician will use a **lensometer** to orient and mark the lens blank appropriately. A **grease pencil** should then used to mark each lens with an "R" or an "L", which is used to identify the lens as right or left, respectfully, throughout the edging and assembly process. Following the layout process, the lenses proceed to the edging station. The frame's demo lenses are popped out, but screws are left completely tightened to ensure an exact trace. The frame is then placed into the **tracer**, which may or may not be physically integrated into the edger. After tracing, each lens blank is oriented properly according to the patient's pupillary distance. One **block adhesive pad** is then placed onto an **edging block**. This complex is then firmly adhered to the lens blank. The same process is repeated for the left lens. Once the frame has been traced and the edging blocks are applied, the outline of the frame is sent to the **edger**. The lens blanks are placed into the edger and grinded down according to measurements taken by the tracer. Once the edging is completed, the job is ready to be assembled. A **hand stone wheel** should be used to eliminate sharp edges on the lenses that could cause potential injury. **Block pliers** are used to remove the blocks from the edged lenses. An **optical screwdriver** is used to loosen the eye wire screws. The edged lenses are then placed into the frame, and the eye wire screws are tightened. Once assembled, it is important for the optician to verify that the lenses are still oriented correctly in the frame by using the **lensometer**. Optical centers should be marked and the pupillary distance should be verified using a **PD stick**.

Now that we have discussed the equipment that the authors deem necessary for a functional "in-house" lab, it seems fitting to discuss the prices of such equipment. Since

the aim of this project is to, in part, determine a practical cost of equipping an "in-house" lab, we will use a combination of median-to-low values when discussing pricing. Extensive research has been done to determine such prices, and "low" and "median" values have been calculated. All data pertaining to pricing discussed below will be in reference to the authors' current research. A concise list of equipment and prices can be found in Table A. A more extensive pricing sheet can be found in Appendix B.

The "big ticket" item is the patternless edger. The median cost of an edger is around $13,000. We will use this number, but the total cost of equipping an "in-house" lab depends heavily on the price of the edger. Lensometers range in price from $300 to $1,400. The median value is approximately $650, which still seems slightly high since almost any functioning lensometer will do for laying out and verifying jobs. Grease pencils are quite cheap; approximately $8.50 per 12 pack. Optical screwdrivers were found to be $8.00 each. A hand stone costs approximately $350. In order to preserve the quality and functionality of the hand stone, two hand stones are necessary; one for plastic lenses and one for polycarbonate. Blocks cost around $5.00 per piece. From experience, 30 blocks is more than enough for a small "in-house" lab, equating roughly to $150. Block adhesive costs $100 for a 2,000 count roll. It is important to realize that this is not a one-time-only cost, as adhesive pads are discarded after each use. Both block pliers and standard optical pliers cost $18 per piece. One block pliers and two standard optical pliers would be adequate for a small "in-house" lab, totaling $54. PD sticks are quite inexpensive, averaging $2. From experience, several of these should be kept on hand as they are often misplaced.

The total cost of all equipment listed above is $14,702.50. It is important to keep in mind that the edger is the most expensive piece of equipment, and therefore should be carefully selected with attention given to functionality, condition, and price.

There are several pieces of equipment that are not a necessity for an "in-house" lab, but would be a nice addition and likely increase the labs profitability. Such items and prices will be discussed in this paragraph. A full list of *optional* equipment can be found in Table C. Tinting lenses is a very easy procedure to perform in an "in-house" lab. The median value of a tinting apparatus is around $700. With such an apparatus, a skilled optician can perform a gradient tint, but it is often easier to have a machine that does it in order to exactly match lens pairs. A gradient machine costs in the neighborhood of $270. Trays are one of the best ways to keep jobs together. A small lab would probably be able to get by with 20 trays. A single tray costs $2.00. Since dirty, grungy frames are encountered on a somewhat regular basis, it would not be a bad idea to have an ultrasonic cleaner on hand. The median price found for this piece of equipment is $55.00. Extra screws and nosepieces should be on hand. An expected combined total for these sets is around $108.00. A lens clock would be handy to have and costs $84.00. Finally, a frame warmer is considered a *nearly essential* piece of equipment. The median price found for a frame warmer is $248.00. The total price of *optional* equipment listed in this paragraph adds up to $1505.00; however, since this equipment is not mandatory, the optometrist is able to pick and chose from this list.

In order to better understand the profitability of an "in-house" lab, we offer this cost-benefit analysis. Through consultation with various optometrists separate from the survey, we determined that labs typically charge about $8.00 to edge an uncomplicated job. Let's say that edging your own lenses will save you $8.00 per job. We have determined the total cost of necessary and optional equipment to be $16,207. In order to make up this cost over 5 years, the lab would have to edge 405 jobs per year—that is just under eight jobs per week. Any jobs past eight would profit $8.00 a piece. According to our survey, offices average anywhere between 10 and 50 jobs per week which showing obvious profitability. Keep in mind that these estimates are only taking into account the money that is saved by edging lenses in-house. There is additional profitability in tinting, roll polish, and partial rimless jobs—all of which have individual markup potential!

**Table C – Optional Optical Lab Equipment**

| Equipment |
|---|
| Frame Warmer |
| Gradient Machine |
| Lens Clock |
| Lens Groover |
| Lens Stock |
| Nosepiece Set |
| Optical Screw Kit |
| PAL Identification Cards |
| Tinting Apparatus |
| Trays |
| Ultrasonic Cleaner |

In conclusion, we hope to have given the reader a better understanding of how practical and economically beneficial an "in-house" fabrication laboratory can be for a private practitioner. A thorough description of necessary and optional equipment was given, as well as a cost-benefit analysis. The analysis was based on current pricing norms, and showed definite profitability. We feel that we have proven that offices that utilize an "in-house" laboratory have great earning potential.

## REFRENCES


1. AIT Industries. (January 2011). Retrieved from www.aitindustries.com
2. Amazon.com, Inc. (January 2011). Retrieved from www.amazon.com
3. eBay Inc. (January 2011). Retrieved from www.ebay.com
4. FrameDisplays.com. (January 2011). Retrieved from www.framedisplays.com
5. Koch Optical. (January 2011). Retrieved from www.kochoptical.com
6. Pioneer International. (January 2011). Retrieved from www.pioneerdoctor.com

# APPENDIX A

# SURVEY

In-House Lab Survey

1. When did you start the in-house lab?

2. What type of jobs/lenses do you cut?

3a. Who does edging?

3b. When does this person do edging?

4. What equipment do you have?

5a. What type of jobs do you send out?

5b. Who do you send these jobs to?

5c. What percentage of total jobs are done in-house?

6. What do you consider essential equipment for an in-house lab?

7. How many jobs do you cut per week?

8a. Where do you get your lenses from?

8b. How much do they cost?

9. How often do you restock lenses?

10. Do you offer tinting?

Again, thank you for taking the time to fill out this survey for us! It is GREATLY appreciated!

# APPENDIX B

# OPTICAL LAB EQUIPMENT PRICING TABEL

## Full Pricing Table of Optical Lab Equipment

| Equipment Item | Ebay[3] | Amazon[2] | Pioneer[6] | Frame Displays[4] | AIT Industries[1] | Koch Optical[5] | Lowest Cost | Median Cost |
|---|---|---|---|---|---|---|---|---|
| **Block Pliers** | N/A | N/A | N/A | N/A | $18.00 | N/A | **$18.00** | **$18.00** |
| **Blocking Pads/ Adhesives** | N/A | N/A | N/A | N/A | $100.00/ 2000pc | N/A | **$100.00/ 2000pc** | **$100.00/ 2000pc** |
| **Blocks** | N/A | N/A | N/A | N/A | $5.00/pc or $69.00/20pc | N/A | **$69.00/ 20pc** | **$4.25/pc** |
| **Frame Warmer** | $300.00 | N/A | N/A | $149.00 | $500.00 | $195.00 | **$149.00** | **$248.00** |
| **Gradient Machine** | N/A | N/A | N/A | N/A | N/A | $270.00 | **$270.00** | **$270.00** |
| **Grease Pencils** | $7.50/ 12pc | $8.00/ 12pc | N/A | N/A | $19.00/12pc | N/A | **$7.50/ 12pc** | **$8.00/12pc** |
| **Handstone** | $300.00 | N/A | N/A | $300.00 | N/A | $500.00 new | **$300.00** | **$367.00** |
| **Lens Clock** | $191.00 | N/A | $72 | $84.00 | N/A | N/A | **$72.00** | **$84.00** |
| **Lens Groover** | N/A | N/A | N/A | $342.00 | N/A | $495.00 | **$342.00** | **$420.00** |
| **Lens Stock*** | N/A | N/A | N/A | N/A | N/A | N/A | **N/A** | **N/A** |
| **Lensometer** | $340 – 800.00+ | N/A | N/A | $650.00+ | $1,330.00 | $700.00 | **$300.00** | **$700.00** |
| **Nosepiece Set** | $4.00/ 50pc | N/A | N/A | N/A | $60.00/ 150pc | N/A | **$4.00/ 50pc** | **$4.00/50pc** |
| **Optical Screw Kit** | $100.00 | N/A | N/A | N/A | $100.00 | N/A | **$100.00** | **$100.00** |
| **PAL Identifier Cards **** | N/A | N/A | N/A | N/A | N/A | N/A | **N/A** | **$0.00** |
| **Patternless Lens Edger** | $9,000-12,000.00 | N/A | N/A | $14,000+ new | N/A | $15,000+ new | **$9,000.00** | **$13,000.00+** |
| **PD Stick** | N/A | N/A | $2.00 | N/A | $2.00 | N/A | **$2.00** | **$2.00** |
| **Pliers Set** | $40.00/ 4pc | $62.00/ 9pc | $20.00/ pc | $18.00/ pc | $20.00 pc | N/A | **$40.00/ 4pc** | **$18.00/pc** |
| **Screwdrivers** | $32.00/ 4pc | $10.00/ 4pc in one | $9.00/ pc | N/A | $8.00/pc | N/A | **$8.00/ pc** | **$8.00/pc** |
| **Tinting Apparatus** | $700 – 3,000.00+ | N/A | N/A | N/A | $530.00+ | $480.00+ | **$480.00** | **$700.00** |
| **Trays** | $40.00/ 24pc new | $1.00/pc used | N/A | $5.00/ pc new | $48.00/24pc new | N/A | **$1.00/pc** | **$2.00/pc** |
| **Ultrasonic Cleaner** | $30.00 | $35.00 | N/A | $110.00 | $75.00+ | N/A | **$30.00** | **$55.00** |

* Lens stock too variable to accurately estimate

** PAL Identifier Cards are usually supplied free of charge by the lens representatives