5. MANUFACTURING AND OPERATIONS PLAN

5.1 Development Status: Alpha Prototype

The current **e•pen**™ physical implementation consists of several sub-units. The main sub-units are the shell, electronics and detectors. See the **e•pen**™ Alpha Prototype Assembly drawing on the next page for the current physical implementation.

The **e•pen**™ shell will easily attach to markers, pens, pencils and even chalk. The electronics will be pre-packaged and then inserted into the shell for protection. Detectors will be affixed to wallboards with adhesives or clips.

The first **e•pen**™ shell will be made using laminated-object-manufacturing and cost approximately $400. This shell can be used to make soft tooling that will suffice for resin casting. Silicone rubber molds will be used in the resin casting process. Short production runs up to 15 units have been priced by Curci Models at less than two hundred dollars per shell. The first detectors will be made in similar fashion at similar cost.

e•pen™ product literature including pamphlets, instructions, and warranty information will be provided by an as yet to be selected publisher. Internal and external packaging will be supplied by Collins Box Company for less than one dollar per unit.

5.2 Strategy and Plans: Production Model

The shells and detectors will both be made from high impact strength thermoplastic resin for durability and long life.

Hard injection mold tooling is most suitable for making large numbers of shells and detectors. Twenty thousand parts can be made from one machined and polished injection mold. One mold will be required for making shells and another for making the detectors.

A mold for making the shells can produce 4 units in approximately 10 seconds. During that time, molten plastic is injected into the mold, allowed to cool and ejected ready for the insertion of an electronics package. Over 2,800 shells can be made in one 8 hour shift with a dedicated molding machine. The plastic detectors will also be manufactured using an injection molding tool. Approximately 1,000 detectors can be molded in an 8 hour shift.

Each mold will cost less than $10,000 including special rework and polishing. Therefore, the total up front cost will be less than $20,000 for both molds. The incremental cost of a shell or detector will be about $0.10 once production begins.

Lead times of 9 months are not uncommon for plastic injection mold tooling. This time constraint is being compressed by concurrently consulting with toolmakers during prototype development. As soon as the prototype design is frozen, we plan to switch to injection molding tooling which has a very attractive marginal cost.

Industrial design consultant Anthony Pannozio is being sought to provide insight on increasing **e•pen**™'s consumer appeal.

Figure 3 - Alpha Prototype Assembly Drawing

Figure 4 - Implementation Schedule