Design Requirements

It is useful to specify some sample tasks that a laser cutter could be used for. These scenarios suggest some potential applications of laser cutting in an effort to define the design objectives.

Project Scenario 1: Media Storage Rack

This project involves the manufacture of a rack that would hold the user's collection of removable media: CD's, DVD's, Zip disks, etc. In this scenario, a customer purchases a software design tool from a website, and downloads it to a PC. The dimensions of his or her available space are entered, including irregularities specific to the room or other furniture. The user specifies the storage capacity of the system (e.g. 200 CD's, 50 minidiscs, 20 VHS tapes), and selects from various materials and surface finishes.

After the necessary materials are delivered, the user follows on-screen prompts to place sheets of raw material onto the laser bed. Pieces are cut in order of use, and a customized multimedia tutorial guides the user through assembly. Tab-and-slot design allows most pieces to be joined without any fasteners. Finally, the user has the option of printing out a set of labels to organize the collection.

IKEA Corp.

Project Scenario 2: Personalized Backpack


PRODUCT SHOT W/3M LOGO

This project consists of creating a knapsack for carrying books or personal items. Many features- material type and color, number and type of pockets, strap length, personalized initials, etc.- are customized for a particular user.

As in the previous project, a custom software application could guide the user through all steps of manufacture. The laser cutter would be used to cut sheets of synthetic fabric and foam padding. After placement by the user, the laser could again be used to "weld" the pieces by melting them together.

LLBean Corp.

Design Specifications

Having described some possible tasks, we can list target design specifications for a low-cost laser cutter. Although no first-generation design would satisfy all of these goals, they are meant only to serve as a guide to the constraints and opportunities.

Physical	• size <500cm in any dimension • weight <100 lb. • internal air filter (no exhaust)

Functional	• cutting of wood, plastics, fabric, rubber <1cm thick • cutting rate (1cm acrylic): >1 cm/sec. • drilling of same materials • life cycle of 36 months
External	• cost <$300 • safe to operate in home environment (laser classification) • user-maintainable • 3 year operating life • no louder than a vacuum cleaner