CHAPTER 5
MILWAUKEE SCHOOL OF ENGINEERING

1025 NORTH BROADWAY
MILWAUKEE, WISCONSIN 53202-3109

Principle Investigator:

Thomas J. Swiontek, (414) 277-7344
swiontek@msoe.edu

Linear Motion Deflasher: A Workstation for Handicapped Workers

Designers: Mike Alkire, Brian Peters, Mike Reilly, Lisa Slauson
Client Coordinator: Roger Van Ryzin
Portal Industries, Inc.
Supervising Professor: Dr. Daniel Brandt
Milwaukee School of Engineering
1025 N. Broadway
Milwaukee, WI 53202-3109

INTRODUCTION

The goal of this project was to design and construct a prototype of a machine to enable a handicapped person to perform a useful job function at Portal Industries, Inc. Workers had been filing by hand to finish molded plastic parts. This was a laborious and messy process. To improve the process, a workstation was designed to help remove most of the flashing from the plastic parts. The workstation can be operated by a person handicapped in hearing, speech or leg mobility. Good eye-hand coordination is required. The device is sized and positioned so that the work can be done from a sitting position. It can used by a person in a wheelchair.

SUMMARY OF IMPACT

It takes approximately 15 to 20 minutes to remove the flashing from the plastic molded part by hand. The process is also messy due to the amount of flashing that is being removed and the means by which it is being done. This job is considered undesirable by some workers due to the amount of dust created in the process. The workstation removes the majority of the plastic flashing in about five minutes. Some hand filing is needed after the workstation finishes the part, but this takes less than five minutes. The time per part is reduced to 10 minutes or less. The majority of the flashing is removed in the workstation, and thus most of the debris goes into the dust collector drawer.

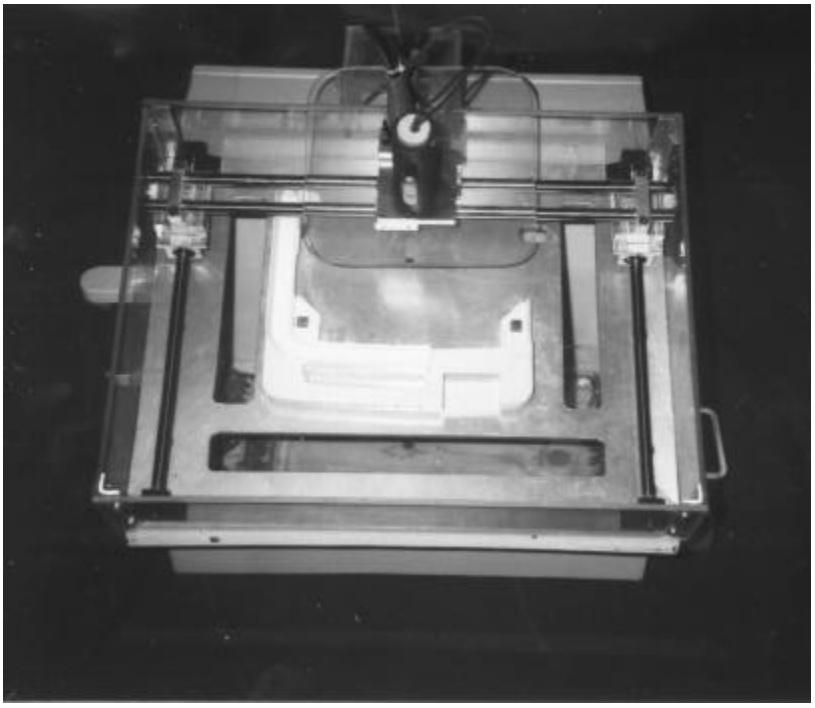

Figure 5.1. Top View of the Linear Motion Deflasher.

TECHNICAL DESCRIPTION

A basic layout of the design is shown in Figures 5.1 and 5.2. The workstation has a platform that sits at a 20-degree angle from horizontal so the worker can view the whole part at one time. The angle was also chosen so the debris would fall into the collection drawer. The platform is a 3/8-inch aluminum plate measuring 21 x 16 inches. The workstation has overall dimensions of approximately 18 inches tall, 24 inches deep, by 21 ½ inches wide. The grinding mechanism is a rotary file driven by a variable speed motor (Fig. 5.2.). The rotary file is connected to the motor by means of a three-foot flexible shaft. The bit assembly moves with the aid of Thompson linear bearings on steel hardened ½-inch shafts that allow motion in a single plane.

To make room for inserting the part, the bit assembly is moved to the top of the workstation and held securely with a fixture. The worker then puts the part into the workstation from the top. The part is guided into place and held stationary by two locator pins. The worker detaches the bit assembly, depresses both triggers, and then grinds off the flashing. The flashing from the plastic part is removed by simply tracing the outline of the part.

There are many safety features built into the workstation. The first is the dual trigger design. One trigger is on the grip of the bit assembly and the other is on the grip mounted on the side of the workstation. Because workers must use both hands to activate the two triggers, they are not able to reach inside the workstation and have their hands come into contact with the rotating bit. There is also a Plexiglas guard on the top of the bit assembly to prevent any sleeves or hair from getting caught in the rotating bit. The workstation has Plexiglas side walls to contain the debris from the grinding and to prevent the worker from reaching in from the sides. There is a safety switch on the rear access panel of the workstation. This panel allows access to the electronics of the station, including the speed control and motor. The safety switch will open the circuit to prevent the risk of electric shock or the mechanism being turned on when the panel is opened. Finally, there is a fuse in the circuit that will prevent the motor from drawing too much current.

The final cost of the Linear Motion Deflasher was $736. The majority of this cost was for the linear bearings and the hardened steel shafts, which totaled $509. The machining of the aluminum plate and the bit assembly were done in the machine shop of the Milwaukee School of Engineering, thus reducing the construction cost.

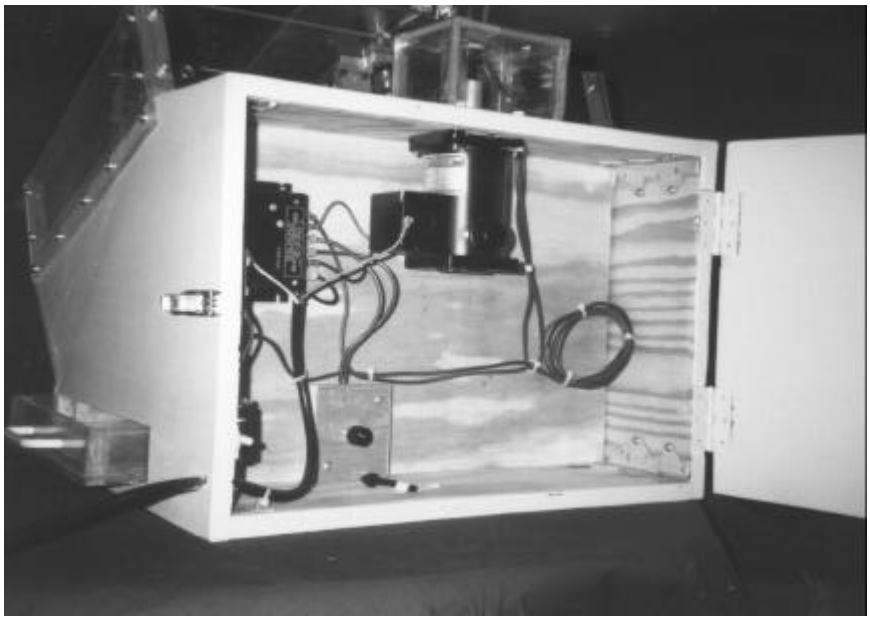

Figure 5.2. Back and Inside View of Linear Motion Deflasher.


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