

## 1. Introduction and Summary of Findings

Remanufacturing is a little-known industrial activity that is both economically and ecologically significant in the United States. Remanufacturing restores a wide variety of worn-out, discarded durable products to like-new condition, prolonging their useful life, and reducing demand on our human and natural resources. Remanufacturing is being carried out in over eighty different product groups. It is a \$53 billion industry, employing about one-half million people across the country.

Despite its apparent size, remanufacturing accounts for only a small fraction of the total durable product output of the country. There is room for additional business, particularly in sectors that have not, for various reasons, been fully exploited.

The Boston Remanufacturing Project was established in recognition of the economic development potential of remanufacturing. Because it is like light manufacturing in nature, requiring only modest capital investment and utilizing relatively low-skilled people, it has the potential for re-introducing industrial-type jobs and wages into urban areas where people are underemployed or unemployed. The intent of this project is to see if it is feasible to establish new remanufacturing enterprise into Boston's inner city, specifically in Boston's Chinatown community. Medical equipment is the primary focus of the study, but we have not refused to consider other opportunities that have cropped up during the study.

This multi-year project is being conducted by a team from Boston University's Manufacturing Engineering Department. It is led by Professors William M. Hauser and Robert T. Lund, and has involved a number of students from the Engineering College. Douglas C. Ling, Director of Economic Development of the Asian Community Development Corporation has also been a participant.

Exploratory work on the project began in 1998, with visits to the various agencies and firms in the Boston area that are involved in some way with economic development. Through a series of meetings and presentations, we were able to establish contact with groups that could be helpful if a new enterprise were to be started. With funding from the Office of Business Development of the City of Boston, we were able to assess the status of remanufacturing in Massachusetts<sup>1</sup> and to evaluate potential product areas for a Boston enterprise. Medical equipment was identified as having potential for this region.

During the latter part of 1999 and the first three quarters of 2000, our work has been supported by funding from the Chelsea Center for Recycling and Economic Development, part of the University of Massachusetts, and by additional funding from the City of Boston for student research assistants. Our task in this first year of what was envisioned as a two-year program was to "investigate the potential for medical equipment remanufacturing in Chinatown." Our project goals were these:

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<sup>1</sup> Steinke, N.W., W.M. Hauser, and R.T. Lund, *Massachusetts Remanufacturers*, Boston University, November 1999.

- Technical and market analysis of the potential for medical equipment remanufacture
- Evaluation of legal and regulatory constraints
- Evaluation of competition in the New England region
- Search for potential entrepreneurs
- Preparation of a business plan
- Community acceptance of remanufacturing

This report on the work that has been accomplished in the past twelve months follows generally the topics listed in the above goals.

Although our investigation looked at the medical equipment field broadly from an economic standpoint, to narrow our investigation for technical and marketing evaluation we selected the dental chair as representative of a class of equipment having ideal characteristics for remanufacturing. Much of this report, therefore, focuses on the dental chair as a remanufacturing candidate, but it should be kept in mind that other similar items of medical equipment will share both the positive and negative features we found for the chair.

In summary, we find that there is, indeed, potential for medical equipment remanufacturing in Boston. Among the positive factors leading to this conclusion are these:

- Boston and the New England region is a rich source of discarded or traded-in medical equipment because of the high concentration of health care institutions in the area.
- Chinatown has a labor force that possesses the requisite skills, both at executive and at worker levels.
- The market for medical equipment is both domestic and international, with potential connections, in particular, with China.
- Medical equipment pricing relative to the cost of obtaining cores provides a substantial “umbrella” under which a remanufacturer should be able to operate profitably.
- Many types of medical equipment satisfy the criteria for remanufacturability set up in earlier research.
- Boston is a major center for innovation and business startups, with socially responsible investors and venture capitalists who will listen to a well-developed business plan.

The results of this year’s study have been very encouraging, and we intend to pursue funding that will enable us in future months to see the project through to a successful conclusion – the establishment of a new viable remanufacturing enterprise in Boston.