



Jack Barckhoff, P.E.

TOTAL WELDING MANAGEMENT VOLUME II

**Perfecting Your
Welding Operations**

Total Welding Management Volume II © copyright 2025 Jack Barckhoff, P.E. All rights reserved. No part of this book may be reproduced in any form whatsoever, by photography or xerography or by any other means, by broadcast or transmission, by translation into any kind of language, nor by recording electronically or otherwise, without permission in writing from the author, except by a reviewer, who may quote brief passages in critical articles or reviews.

ISBN: 978-1-64322-374-2

Cover and interior design by Jess LaGreca, Mayfly book design

First Printing: 2025

Contents

Acknowledgments	v
Dedication	vii
About the Author	ix
Foreword	xi
Introduction	xiii
Chapter 1: Phase I—Survey & Evaluation	1
Chapter 2: Phase II—Management Planning & Goal Setting	41
Chapter 3: Phase III—Implement & Sustain	51
Chapter 4: Training and Conducting Training	77
Chapter 5: Performance Measurement System	97
Appendix 1: Survey & Evaluation Aids	101
Appendix 2: Training Aids and Availability	217
Appendix 3: Magazine Articles	221

Acknowledgments

I have been blessed throughout my career by having many very knowledgeable and talented people give me the support and encouragement I needed to develop the concept of Total Welding Management and the Total Welding Management System using the Barckhoff Method—and to write this book. I'm thankful for each of them, especially the many welders, supervisors, engineers, and managers of the companies I assisted, and the various very capable and dedicated engineers who provided their services as consultants to my client companies. I could not have accomplished nearly as much without their assistance.

Walter R. Edwards, P.E., Gregory Krause, P.E., and John M. Menhart, P.E., worked with me in the very early stages of developing and applying the Total Welding Management System using the Barckhoff Method, and for many years Donald L. Lynn, P.E., and Kenneth M. Kerluke, P. Eng., were key consultants in my company.

I also want to acknowledge and thank Robert Lockwood, a former customer of mine and a dear friend for many years, for encouraging me to undertake the writing of this book and giving me so much assistance as I worked to finish it.

Robert and Phillip M. Schmidt, P.E., another close friend and longtime BWMC consulting welding engineer who is still active in my company, worked together with Katherine Burge and her American Welding Society team of Katie Pacheco and Michael Riobueno to edit and format what I

wrote and get it published. I am very grateful to all of them for their hard work and for doing such a good job.

And finally, I want to acknowledge and thank the many other special people who have not been specifically mentioned that have helped me to be successful in my career and/or helped make this book possible.

Jack R. Barckhoff

Dedication

This book is dedicated to the many men and women welders and supervisors supported by their company's Upside-Down Organization to produce consistent and repeatable product output.

About the Author

Jack R. Barckhoff has made significant contributions to the welding community and industry through his distinguished organizational leadership. His outstanding career has helped enhance the image and impact of the welding industry. In recognition of his service and support for the welding industry, the American Welding Society selected Barckhoff as a Counselor in 2004.

Barckhoff is a visionary in the field of joining disciplines, seamlessly integrating welding within larger manufacturing and management structures. Throughout his more than 60-year career, he has been passionately committed to pursuing the development and implementation of management tools to improve the productivity, quality, and profitability of welding operations in companies.

Barckhoff, a Life Member of the American Welding Society and a past chairman of his local Section, has made significant contributions to the welding community. He successfully developed his 3-phased Barckhoff Method of the Total Welding Management System and committed countless hours to promoting welding as an engineering science rather than an art only. Barckhoff has demonstrated his dedication to “giving forward” by providing educational scholarships for welding engineering students locally and nationally.

Barckhoff’s legacy lies in his interest in working with companies involved in welding to discover new and improved welding techniques. He implemented these ideas and provided training to enable people to uti-

lize these techniques effectively. Barckhoff also established two annual Jack R. Barckhoff Welding Management Scholarships, in association with the American Welding Society, for Ohio State University and other universities. He studied both Mechanical Engineering and Business Administration at Ohio State, and from 2005 to 2015 Barckhoff taught his Total Welding Management System to graduate welding engineering students at the University. He is a registered professional engineer.

Barckhoff served in both the U.S. Navy and the Army Field Artillery, rising to the rank of Captain. He also taught ROTC at Ohio State University. After his military service, Barckhoff became a welding engineer at The Lincoln Electric Company, where he managed two sales offices. During his tenure at Lincoln Electric, he developed and delivered lectures on his successful, cost-reduction sales approach at national and regional sales meetings. While working at Lincoln Electric, Barckhoff also developed a top management sales approach with a systematic approach and methodology aimed at improving productivity, quality, profits, and the company's competitive position.

Foreword

I first sought assistance from Jack Barckhoff during a shortage of electric motors while working for a major manufacturer of fans and blowers for manufacturing plants and commercial buildings. In the mid-1970s, the manufacturing industry was booming, causing delays in motor production at companies like The Lincoln Electric Company. As a result, my plant had a backlog of assembled products waiting for motors to be shipped. Together with my purchasing agent, we met with Jack, the manager of the local Minneapolis Lincoln Electric office, demanding that he provide us with the first available motors. Although Jack listened to our demands, he demonstrated his integrity by informing us that we needed to get in line with everyone else.

During his tenure at Lincoln Electric, Jack continued to serve as a supplier for my company. We underwent a significant plant expansion and purchased many welding machines from Lincoln Electric. Additionally, we requested that they provide setup services for the machines and train our welders in their operation and use. Through this experience, I gained an appreciation for Jack's deep knowledge of welding.

One day, Jack visited my office to share his plans to depart from Lincoln Electric and establish his consulting engineering, training, and consulting company. With encouragement from myself and others, Jack pursued his vision. Despite the change, he continued to provide services for our company.

As the president of Barry Blower Company, I requested Jack's presence at my plant. Upon his arrival, I introduced him to other senior managers

with my hand in my coat pocket. When I removed my hand from my pocket, I revealed a large weld nugget that I had discovered within a failed fan at a customer's foundry. This event prompted me to hire Jack and his consulting firm to conduct a survey of our welding operations, identify the root causes of subpar welding, and implement necessary changes to correct any issues. This was the precursor to the Total Welding Management (TWM) System that Jack later developed utilizing the Barckhoff Method.

As I transitioned to two other organizations, Jack remained my trusted point person for welding-related issues. Additionally, I have closely monitored the progress of Jack's company, Barckhoff Welding Management Corporation (BWMC), in executing TWM initiatives utilizing the Barckhoff Method, in numerous companies with a heavy reliance on welding. I was even fortunate enough to witness Jack's presentation of the science of welding to the senior leadership of a large truck equipment manufacturer. I observed firsthand their eagerness to learn and comprehend the fundamentals of proper welding and troubleshooting techniques.

Over the last four decades, the TWM System developed by Jack utilizing the Barckhoff Method has been effectively executed in numerous companies that rely heavily on welding.

As a result, Jack has amassed an extensive collection of procedures, spanning hundreds of pages, to aid in the successful implementation of TWM. By training engineers at BWMC on how to carry out these implementation projects, Jack has created a significant volume of copywritten material. He now seeks to distribute this material to the welding industry to ensure that his legacy, as well as the legacy of the TWM System, will benefit all those working in the field. This book grants access to both the material and the insights of the individual who created it.

I highly recommend reading this book to gain an understanding of how the TWM System can be implemented within a manufacturing plant. I also recommend reading this book to learn about the long-lasting benefits it will provide. Upon learning about the TWM System and the Barckhoff Method, it is worth considering leading the personnel in your organization through the implementation of TWM. Doing so will yield numerous advantages for your company.

Robert Lockwood

Introduction

Throughout my many years of serving the welding industry, I developed the Total Welding Management (TWM) System. The TWM System is designed to improve your company's welding productivity, quality, profitability, and competitive position. Over the past 40 years, my team of trained consulting welding engineers and I have implemented the TWM System using the 3-phased Barckhoff Method in numerous companies across the United States, resulting in significant reductions in welding costs and improved profitability, as well as an enhanced competitive position.

This book is a step-by-step guide to successfully implementing the TWM System. My intention is not to sell you anything, as you have already purchased this book for your organization to implement this management system with your own team. My sole aim is to assist you in the process.

The guidelines provided in this book, along with the associated documents and training programs, offer you the controls required to meet your product output demands and prevent production line breakdowns and other issues that may prevent you from meeting the required product output to satisfy customer needs.

If you are unsure if the TWM System is necessary for your company, I ask that you go unaccompanied to the production floor of your operation and count the number of welders producing repeatable and consistent output versus those welders performing unnecessary tasks they need not be doing. Some things you want to be looking for as problematic are workers having to pound parts together due to poor material fit-ups and poor

bead shape appearance due to weld spatter on the base material. This means that some of the welds produced have poor cosmetic appearance, requiring excessive grinding.

As you will also possibly observe, the welders may be spending unnecessary time chasing necessary parts for the weldment and going back and forth to the tool crib for replacement parts. All this is wasted delay and motion time taken away from productive welding time, thereby decreasing product output. Do you now see your welding operation as a cost center or profit center?

The problems mentioned above are possibly caused by one of several factors: not meeting design specifications; no issued welding procedure available on the production floor, and if welding procedures are available they are not being used; and a lack of monitoring of the welders on a regular basis by the supervisors. With proper monitoring, when a situation occurs that causes the welder a problem, there are available resources along with a response for corrective action. All are part of the TWM System using the Barckhoff Method with its systematic approach and methodology.

This second TWM book comes at a crucial time, coinciding with the retirement of baby boomers and the consequent reduction in the skilled workforce. As a result, many companies are facing challenges in maintaining their productivity due to the shortage of well-trained workers. The decreasing labor force is putting additional pressure on current employees. The U.S. Department of Labor's Occupational Outlook Handbook projects that 42,600 welders will have to be replaced by new workers over the next 10 years.

This TWM System, in conjunction with the management philosophy of the Upside-Down Organization, emphasizes and facilitates the welder's success in delivering consistent and repeatable product output from each workstation.

Using the TWM System will help you achieve a more efficient and smarter workforce, working with better attitude, morale, and self-esteem. The system is not aimed at teaching welding, rather it is a management system intended to create a paradigm shift in organizational culture for managing a business with a high dependence on welding. It is a management system that integrates the science of welding technology with sound management principles.

CHAPTER 1

Phase I—Survey & Evaluation

Identifying Your Opportunities for Improvement

Starting with Phase I—Survey & Evaluation, you have taken the first step to implement the Total Welding Management (TWM) System. The Phase I—Survey & Evaluation data gathering process is critical for identifying where your company is now and where it needs to be. The survey findings will help you decide where your company needs to be through observation, measurement, and interviews with personnel at all levels in the company, including the Four Critical Functions of Design Engineering, Manufacturing Engineering, Manufacturing Operations, and Quality Assurance. The Phase I—Survey & Evaluation team must have a good understanding of and relationship with the Four Critical Functions. The purpose of Phase I—Survey & Evaluation is as follows:

1. To gather and evaluate data in all the company's welding-related areas to find cost-reduction opportunities that will improve productivity, quality, profit, and your competitive position.
2. To understand and know where your company is today, where it needs to be, and how to get there.