

CONCEPTS FOR ANALYZING
**GLASS TEMPERING
PROBLEMS**

50 YEARS OF EXPERIENCE WITH
GLASS TEMPERING EQUIPMENT

BY STANLEY W. JOEHLIN
OF S.W. JOEHLIN, INC.



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Acknowledgments

Many individuals and companies have contributed to the knowledge base I have attempted to summarize in this text. Major corporate contributions have come from Chris Barry and others at LOF/Pilkington, Rick Wright and others at Oldcastle Glass, Bob Maltby at R & D Reflections, Ren Bartoe and others at Vesivius and Tom Noe and many others at my long time employer, Glasstech Inc.

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I would also like to acknowledge many of my consulting clients, who have asked me for in plant training, or to help them on various problems that have indirectly contributed to the knowledge base assembled here. A special thanks to the many, many furnace operators that have shared observations with me as we jointly worked on a problem. Many times the suggestions of the production people expedited the solution of the problem and I remain grateful for all I learned from each of them.

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Introduction

This text is an attempt to summarize my 50 years of experiences around glass tempering machines and my 35 years of lecturing to the Glass Associations fabrication seminars, as an aid to anyone new to the glass tempering process, and perhaps to anyone encountering a new problem due to process changes that are not understood, or when running a new product.

My approach to solving tempering problems has always been a very simple one. This is not a mathematical complicated approach, or an academically rigorous one. There are very few complicated terms or complex equations in this text. The definitions included in the early sections of the report are intended to help someone new to the industry, and would not be accurate or complete enough for a college physics textbook

Over the years the title of this presentation has evolved to “Concepts for Analyzing Glass Tempering Problems”. I believe the major value of this approach, is that it will show you where to begin to look for the fundamental problem, whether the problem is breakage, poor break pattern, controlling stress, warping, roll marking, etc. I attempt to suggest an answer to the question; “What is this fundamental problem, and where do I start to look for a correction?”

In my fifty years of experience there have been many times that I have missed the solution with my first observations, and broken a lot of glass until I understood the problem. I have included many of these “why didn’t I figure that out sooner?” moments to hopefully help the reader avoid some of the mistakes of my career, thus increasing both your companies’ profits and your understanding of what is occurring in your tempering system.

As you read this text, remember that my long-term frame of reference is as a tempering equipment engineer, not a production operator or supervisor. I never operated a furnace for a 40-hour shift, and the only machine I ever supervised the assembly of was Glasstech number one in 1971-72. The majority of my time around furnaces was spent in R & D; in the startup of new models; when we were trying to expand the capabilities of an existing line; when we were running a new product; or when a customer was in trouble.

Disclaimer

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Drawings herein are not to scale.

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