INTRODUCTION

Continuous flow is the ultimate objective of lean production, and creating continuous flow has been the goal of countless kaizen projects. We work at a wide range of manufacturing facilities and see many commendable efforts to create flow. Unfortunately, we see very little of it actually achieved.

For example, it seems that many of us have concentrated on making U-shaped process layouts instead of on the more important part: Creating and maintaining an efficient continuous flow. Almost any grouping of machines that performs processing steps in a sequence is called a 'cell', but it is rare to find real continuous flow which is what actually makes a cell a cell.

Ideally, product would flow continuously all the way through your value streams, from raw material to the customer. But that is too much to tackle at first. You need a place to focus. That place is the 'pacemaker' process or segment of the value stream, where products take their final form for your external customer. This is usually the most important segment of any value stream, since how the pacemaker operates affects both how well you serve your customer and what demand is like for your upstream processes. A steady production rhythm, level mix, and consistent continuous flow of material at the pacemaker process places regular and consistent demands on your value stream.

Yet a closer look at many pacemaker processes shows erratic and intermittent flow of product, fluctuating inventory accumulations between steps, excessive batching, output varying from hour to hour, and poor use of human effort due to the anchoring of operators to individual machines. Performance has certainly been improved over the old process village layouts, where equipment was grouped by type of machine, but much better performance and much leaner value streams are possible.

The objective of this book is to sharpen your eyesight and equip you with skills to achieve and maintain a truly efficient continuous flow of material. We'll concentrate on operator-based cells because this type of processing is so widespread and — in a world of geographically scattered customers and short product life cycles — it is often important to be able to design and manage simple, inexpensive, flexible and reliable operator-based processes. We'll use methods and thinking based on practices pioneered within Toyota and its affiliated companies, which you can utilize nearly anywhere you would like to create a continuous flow.

Tools and techniques can be useful, but the most significant thing you and your team can gain from studying this workbook is a better ability to see and feel flow. As you apply the methods described here you should automatically start to focus less on layout and more on flow. But the most important thing to do is to select one of your pacemaker processes and get started right away — today — because how much we learn depends on our action orientation and persistence in implementation. Don't wait!

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Continuous Flow

This book focuses on creating continuous flow in pacemaker processes. But the concept of continuous flow goes beyond just pacemaker processes, extending everywhere to any production process. Similarly, the tools described in this book can be used in a variety of applications. This list shows the applicability of this book for various types of processes.

Type of Process	Applicability
Completely manual production	**XXX**
Operator driven cells and lines incorporating automated equipment	**XXX**
Conveyorized production lines	**XX**
Partially automated transfer lines (with operator work stations)	**XX**
Fully automated transfer lines (operators as line attendants)	
Highly multifunctional automated machines	

Definition of a Cell

A cell is an arrangement of people, machines, materials, and methods with the processing steps placed right next to each other in sequential order, through which parts are processed in a continuous flow (or in some cases in a consistent, small batch size that is maintained through the sequence of processing steps). The most well-known physical cell layout is a "U" shape, but many shapes are possible. Continuous flow processing is also possible in straight production lines. Many companies use the terms "cell" and "line" interchangeably, as we do in this book.