

Less WIP, shorter lead times: two concrete methods

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In an earlier article, we discussed the benefits of reducing Work In Progress (WIP). Reducing WIP in manufacturing ensures shorter and more stable lead times. This makes production more predictable and planning work easier. But how much WIP is too much? And how do you reduce it as much as possible?

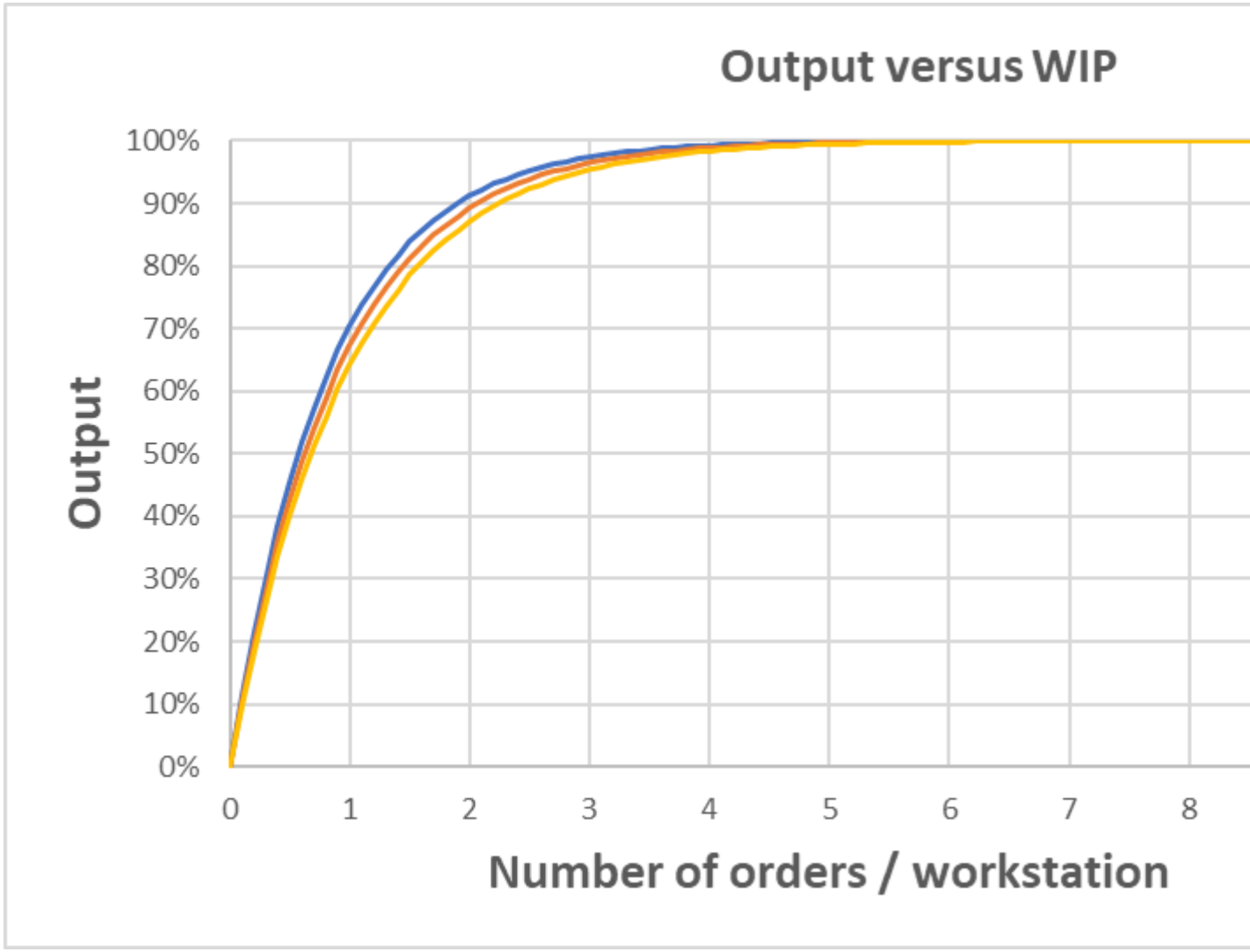
Why less WIP is essential in manufacturing

WIP has a direct impact on both the lead time and output of a production process. Lead time is directly proportional to WIP: the more WIP, the longer it takes to complete an order. The relationship between WIP and output is more complex.

The relation between Work in Progress and output

Let's illustrate this with an example. Suppose you have a production environment with 10 workstations and no WIP. In that case, output is zero because there are no orders available to process. With one order in circulation, only one workstation can work, representing 10% of the maximum output. Two orders would increase the output to 20% if two workstations process them

separately. If they end up at the same station, it's even less. As more orders are added, output rises to a maximum.



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Relationship between output and number of orders per workstation for an environment with 3, 5 and 20 workstations.

Simulations show that maximum output is usually achieved at about 5 orders per workstation. This number serves as a guideline for optimal WIP. Bottleneck workstations best have slightly more WIP (6-7 orders), while less critical workstations sometimes already reach their maximum at 3-4 orders. **Too much WIP does not lead to higher output, but rather to longer lead times and more complexity in planning.**

Are you biting off more than you can chew?

With these guideline values, you can easily assess your own situation. Suppose:

- Your production environment has 10 workstations.
- The average lead time is 4 weeks.
- There are 200 orders in circulation.

With a guide value of 5 orders per workstation, you will ideally reduce the WIP to 50 orders. This represents a 75% reduction, with the lead time falling proportionally from 4 weeks to 1 week. This gives the planner the flexibility to release orders up to one week before the desired end date. Suppliers are also given an extra three weeks to deliver parts.

Waiting to release orders, in two cases

This brings us to the simplest method to limit WIP: do not release orders immediately but wait. This can be done in several ways:

Case 1: Planning and release with an MRP-system

A Material Requirements Planning (MRP) system calculates a start date for each production step through ‘lead time offsetting’. This process makes a reverse schedule, from the delivery date to the production start date. This is done based on the lead times specified for each step. One usually sets these lead times when setting up an MRP-system. They are often chosen with a wide, so-called ‘safe’ margin, e.g. 1 week (or 5 working days) per production step.

For a four-step routing, this means that the MRP-system indicates that an order should start 4 weeks (or 20 working days) before the delivery date. Within an MRP-system, you can reduce WIP if you adjust the lead times in the system.

This is best done incrementally, e.g. first from 5 to 4 working days. Then observe the effects for a few weeks. If no problems occur, you can further reduce the lead times by 1 working day each time. This process continues until a further reduction creates risks, such as unwanted downtime on critical machines.

Case 2: Planning and release without an MRP-system

If the planner releases orders manually, it can temporarily reduce the number of orders released per day, e.g. by 10-20%. By releasing fewer orders, the inflow and thus the WIP decrease.

Once it appears that a further reduction in WIP is no longer desirable, the planner returns to the original release rate. In this way, he avoids the production floor from running dry. To keep the Work In Progress from escalating again, the planner can keep the number of orders released daily equal to the number of completed orders. This stabilises the number of orders on the workfloor.

Ready for the impact on your production process?

With less WIP, you reduce both lead times and planning complexity. In a subsequent article, we will discuss more advanced methods such as **CONWIP, POLCA,** and **Work Load Control.**

Ready to improve efficiency in your manufacturing business?

Find out more about our expertise in Quick Response Manufacturing and how we can help you optimise production with less Work in Progress.

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