FabTime Newsletter

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Information

Publisher: FabTime helps wafer fabs drive improvement via our flexible reporting software and our cycle time management course. FabTime's software empowers fab managers and production leads to evaluate their facility conditions in real-time. Unlike generic analytics tools, FabTime's dynamic interface includes adaptable pre-set charts and dashboards, ensuring decision makers have access to reports on-demand without burdening IT departments with reporting responsibilities. Contact us for a demo.

Editor: Jennifer Robinson

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Contributors: Daniel Burlingame (Analog Devices); Jayson Loewen (Teledyne MEMS)

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Welcome

Welcome to Volume 25, Number 1 of the FabTime Cycle Time Management Newsletter. We hope that your 2024 is off to a great start! In this issue, we have an announcement about the release of the new version of FabTime's software to early adopter sites, as well as the usual highlights from Jennifer's LinkedIn (Lots of wafer fab-related news has been circulating over the past couple of months). Our software tip of the month is about using the new version of FabTime to generate box plots (a long-time goal of Frank's). In our subscriber discussion forum, we have detailed responses to last month's main article about cycle time improvement for 300mm fabs and to a recent subscriber question about managing cycle time for external processes. We so appreciate these subscribers for taking time out of their busy schedules to contribute.

In the previous subscriber discussion forum, we introduced a new metric, requested by a prospective customer, for quantifying the impact of hot lots on regular lot cycle time. After we discussed this metric with our user group, it became clear that a more detailed explanation was needed. In our main article this month we have started with the example from the previous issue and expanded it into a more comprehensive discussion. We think this metric is important because it offers a way to show management the cost of ever-increasing quantities of hot lots in the fab.

In other news, FabTime will be attending the Fab Owners Alliance Collaborative Forum in Phoenix on January 24th and 25th. We hope to see you there.

Thanks for reading and Happy New Year! – Jennifer, Frank, Lara, and the FabTime Team

Community News/Announcements

New FabTime Version Released to Early Adopters

FabTime's new version has been released to early adopters. In this version, we've migrated to a modern chart engine, enabling live charts (chart image responds automatically to data grid filtering and sorting), boxplots, histograms, and multi-pane charts that present both detailed data and summary statistics. We're very pleased with the results. FabTime customers interested in becoming early adopters for the new charting engine should contact support@FabTime.com. Prospective customers who would like to see a demo should visit our Request A Demo web page.

A Few Highlights from Jennifer's LinkedIn

Jennifer continues to share articles about business management, the semiconductor industry, and productivity improvement on her LinkedIn feed. Recent links have included:

- An excellent piece from McKinsey & Company about increasing 200mm wafer fab efficiency by "shift(ing) from reactive firefighting to proactive management of equipment recovery, planned maintenance, and parts management." One highlight: by improving equipment reliability on bottlenecks, "the fab can quickly tap into significant latent capacity—often by more than 10 percent—without adding tools or expanding its footprint." Jennifer also found compelling the section on using short loop root cause analysis to understand "the main causes of tool downtime and develop plans to address them." We'll note that FabTime's software would be an excellent tool for conducting such analyses, and that we highly recommend this piece to newsletter readers. [LinkedIn Post.]
- A WSJ article about how the "fight for chip tech supremacy has begun to migrate into a new area: how to package chips together to achieve better performance." The article says that TSMC and China are well-positioned to capitalize on this situation. [LinkedIn Post.]
- An confirmation by Intel Corporation that it plans to invest a total of $25 billion in Israel after securing $3.2 billion in incentives from Israel's government. "Intel's $25 billion investment is 'an expression of confidence in the State of Israel and the Israeli economy' says Finance Minister Bezalel Smotrich" ... describing the move as 'important and significant.'" [LinkedIn Post.]
- An announcement by NY Governor Kathy Hochul of a $10 billion partnership with leaders from the semiconductor industry such as IBM, Micron, Applied Materials, Tokyo Electron, and others to establish a next-generation semiconductor R&D center at NY CREATES' Albany NanoTech Complex. The news release says that the project "will create at least 700 new direct jobs and retain thousands of jobs." [LinkedIn Post.]
- Congratulations to BAE Systems for being awarded the first Chips Act grant. [LinkedIn Post.] Congratulations also to Microchip for their Chips Act grant. [LinkedIn Post.]
- A WSJ article about the intensifying labor shortage in central Ohio for manufacturing workers, due to the combination of new wafer fab construction by Intel Corporation and a forthcoming large EV battery plant. "Intel has helped to design a training curriculum that will be offered at Ohio's community colleges. The program, which in some cases can be completed in a year at a cost of about $3,700 before financial aid, familiarizes students with semiconductor manufacturing so they can become technicians, an entry-level job that involves maintaining and troubleshooting equipment at the highly automated plants." [LinkedIn Post.]
- In more news about the expansion of the US semiconductor industry supply chain, an announcement from Amkor Technology about a planned advanced packaging and test factory in Arizona. Of course, this will also factor into the coming labor shortage. "The first phase of the

manufacturing plant (with 500k SF of cleanroom space) is targeted to be ready for production within the next two to three years." [LinkedIn Post.]

For more industry news, connect with Jennifer on LinkedIn.

FabTime welcomes the opportunity to publish community announcements, including calls for papers. Send them to Jennifer.Robinson@FabTime.com.

FabTime® Software Tip of the Month

Use the New Version of FabTime to Generate Box Plots

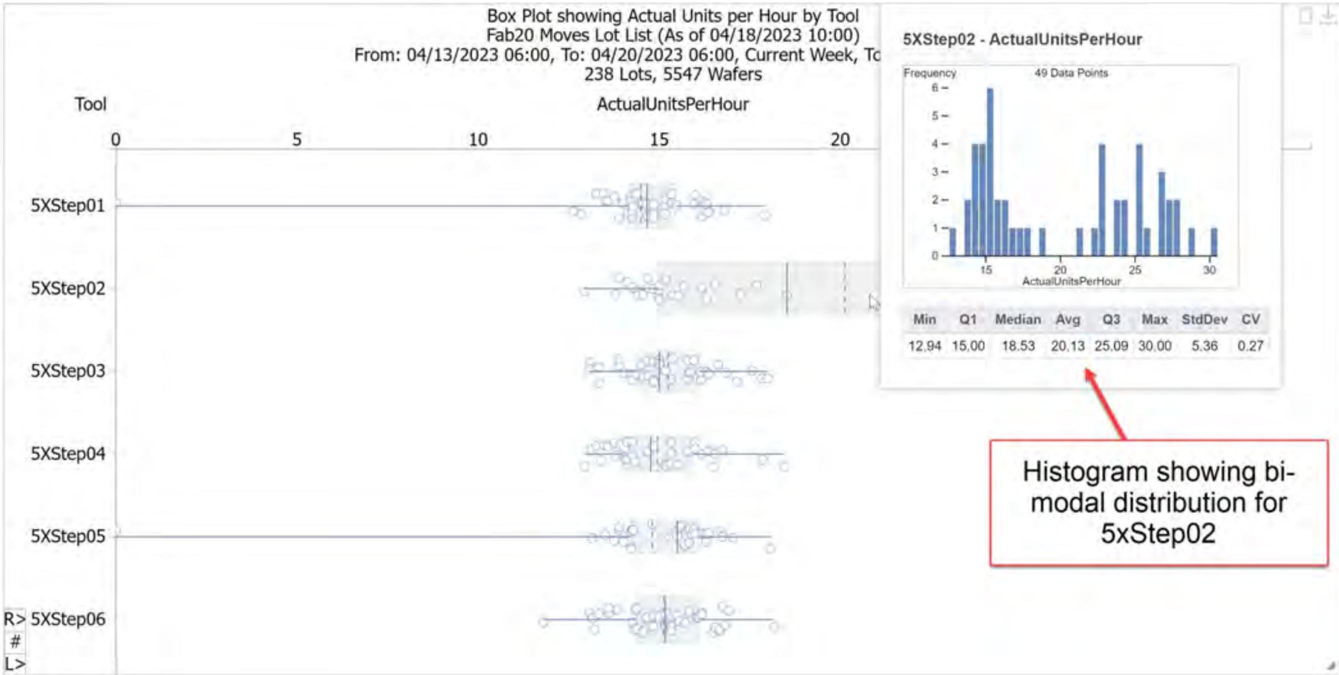
Boxplots are a useful way to visualize the distribution of data. They are particularly useful for comparing the distribution (variability) of data between two or more groups. For example, suppose you collect actual units per hour data for one month prior to a process change, and one month following the change. You could look at the average UPH prior to the change (suppose it is 15.3 wafers per hour), and the average UPH after the change (suppose it is a little better: 16.2 wafers per hour) and conclude that the change was successful.

However, if you look at a boxplot of UPH for the two periods, you may see that the average UPH increased, but the variability of UPH increased as well. This increased variability casts doubt on the success of the change.

Boxplots are now a standard feature of FabTime's edit-chart interface. They can be created on demand for almost every chart in FabTime – only Gantt charts are currently excluded, as the edit-chart interface is not yet available for Gantt charts.

Boxplots are created from FabTime's edit-chart interface. The edit-chart interface is available when a chart is displayed on the individual chart page. Here's an example showing actual units per hour by tool for a tool group.

1. Generate a Moves Lot List chart filtered for a set of tools. If starting with a home page chart, click on the chart to open it on the individual chart page. Below the chart, click on the "Edit Chart" button to open the interface.
2. On the Edit Chart interface, set Chart Gallery to "Boxplot." Two new drop-downs will appear: "Boxplot Categories" and "Boxplot Values." Typically, the category field will be an object (like Tool or Product), and the value field will be a numeric field (like Units per Hour or Cycle Time). In this case, set "Boxplot Categories" to "Tool" and set "Boxplot Values" to "Actual Units per Hour." Then click the checkbox labeled "Activate these edit-chart changes?".
3. Hide the Edit Chart interface by clicking the "Edit Chart" button.
4. Review the Box Plot:
    a. Range (length of the line, distance from minimum to maximum).
    b. Average (the dashed vertical line) and Median (the solid vertical line, 50% of observations fall above and 50% fall below).
    c. Quartiles. The gray box extends from Quartile 1 (25% of the data falls below that value) to Q3 (25% of the data lies above that value).
    d. Data points (the circles).
    e. Data counts (proportional to the height of each box).
    f. Mouse over any of the boxes to view an overlaid histogram, as shown below.
5. Consider questions raised by the data. In the example below, why does 5XStep02 show a bi-modal distribution of process times?



Note that boxplots are likely most useful for list-type charts, as you have access to the raw data for the category and value fields. Many trend and pareto charts are summarized and the raw data is no longer available. See more details about filtering and rotating box plot data and viewing histograms and statistics on the Help page "Boxplots in FabTime" (available from the FabTime Search box).

We hope you find this tip useful.

FabTime software customers can subscribe to the separate Tip of the Month email list (with additional discussion for customers only) here: http://www.fabtime.com/tip-of-the-month.php. Thanks!

Subscriber Discussion Forum

Response to Cycle Time Improvement for 300mm Fabs

In the last issue, we wrote about differences in productivity improvement focus for 300mm (and highly automated 200mm) fabs vs. older, less automated fabs. Just after press time, **Daniel Burlingame of Analog Devices** responded to Jennifer's question on LinkedIn about this topic, writing: "I saw your recent LinkedIn post on the topic of 300mm vs. 200mm. The obvious differences include levels of automation, FDC, error prevention, etc. One thing that is commonly missed is the added complexity of highly reentrant flows across a diverse technology portfolio. High mix, high volume creates different challenges than a single technology node. The complexity of scheduling tradeoffs, line balance, and capacity sharing between technologies requires disproportionate focus on 200mm high-mix legacy fabs.

To clarify this further, the process (not product) mix of 200mm fabs adds levels of complexity. In high volume manufacturing (HVM) digital and memory fabs, there is typically a node of focus, potentially accompanied by a shrink node. Capital equipment is procured with these specific flows in mind, so capacity planning and modeling is simpler. While analog foundries may have process complexity, my experience is these are typically derivative technologies manufactured on the same equipment. An example would be a 180nm node running together with a 150nm node. There are few unique tooling differences between the process lines, though certain processes may need to run with tighter Cpk and/or different design rules.

Many 200mm legacy fabs run process lines with partial, or even zero, tooling synergy. Examples include segregated AP vs. RP EPI processes, disparate backend approaches e.g., planar, semi-planar, and non-planar, and even dual diameter silicon (very little/no overlap in equipment). The codependence of disparate process lines on specific equipment sets adds modeling complexity as the bottleneck on one process flow may overlap with another, necessitating scheduling trade-offs.

In my experience, the most effective way to address the complexity of managing disparate flows in volume is through process harmonization and simplification."

FabTime Response: Thank you for adding a differentiator that we hadn't thought about, Daniel. We can certainly imagine that in a legacy fab you continue making the older products AND keep adding new ones, so the resulting mix of flows ends up higher. We hadn't thought about it, but we agree with you that a primary recommendation to cope with this lies in process simplification/harmonization. We would also recommend strategies for reducing the number of holds and the quantity of hot lots, as both are exacerbated in a high mix environment.

Response to Managing Cycle Time for External Processes

Jayson Loewen from Teledyne MEMS, Inc. wrote: "The last newsletter included an interesting situation in the article 'Managing Cycle Time for External Processes' and a request for community contributions. Here are a few ideas from my experience (and from others' experience that I want to try someday) for how to shorten the lead time of external processes:

- Place your order with the vendor well ahead of time. Factories tend to plan work that is secured with an order with higher attention than promised work unsupported by money. Our project managers usually know about outsource requirements months ahead of time and have enough information to place an order, even if we need to provide more details closer to the outsource date.
- Make the order non-cancellable for more attention.
- Communicate to the factory when you will deliver the material for processing. If they can depend on you being predictable, they might be willing to schedule your work ahead of receiving the material.
- Frequently update the factory if your delivery to them will be delayed. You're asking for shorter lead time, so help them help you by being as good as you want them to be. Demonstrate your respect for their challenges by becoming a partner in communication.
- Factories might object to scheduling before receiving material due to bad experiences in the past—customers (not you, of course) made all sorts of promises, the factory held a tool idle for them, then material didn't show up when promised. The factory lost money, annoyed other customers, and vowed to never do that again. Give them an offer that is irresistible for them: pay in full if you miss the promised delivery time. You've protected their revenue in case they held a tool idle for you. If the cost of outsource is a large portion of the bill of materials, you might negotiate something less rich like paying a portion of the price or allowing you to change the promise date outside of the factory's scheduling cycle (e.g. you're allowed to change the schedule up to two weeks prior to your promised delivery date to their factory and you only pay a penalty if you request a change within that two weeks).
- Think of what would entice your factory to shorten the lead time for one customer. Offer your vendor similar things. Better yet, listen to your vendor's challenges to understand how you could help solve their problems to make a deal enticing for them.

We found that we often had more influence over external processes than we first believed."

FabTime Response: This all sounds like great advice to us! Thank you for sharing. Contributions like these are what keep the subscriber discussion forum going.

FabTime welcomes the opportunity to publish subscriber discussion questions and responses. Simply send your contributions to Jennifer.Robinson@FabTime.com.

Main Article: New Metric: Cycle Time Impact of Hot Lots

Introduction

In the Subscriber Discussion Forum of the previous issue, we introduced a new Hot Lot Cycle Time Impact metric, which captures the impact of front-of-the-line hot lots on regular lot cycle time. We included brief examples to show how the process time of a front-of-the-line hot lot adds to the queue time of *all* lots already in queue.

In a subsequent User Group meeting, customers asked us to expand on these examples to demonstrate the validity of this metric for tool groups with multiple tools and for situations with multiple lots delayed. Rather than splitting this information across two different newsletter issues (and expecting readers to remember details published in the Subscriber Discussion Forum two months ago), we have consolidated and expanded upon Issue 24.05's discussion topic here. We apologize for any redundancy but feel that this new, combined main article will be more useful in the future.

Background

Hot lots are a known contributor to fab cycle time. Although there are many types of hot lots in wafer fabs, they are typically classified into two primary categories: hand carry lots and front-of-the-line hot lots.

Hand carry lots are the highest priority of hot lots. They may be preemptive and require operators to break setups. Often tools are held idle in advance of these lots so that the hand carry lots never have to wait. Hand carry lots are generally very limited in quantity. Often a single person (per shift) is responsible for each hand carry lot as it moves through the fab.

The impact of hand carry lots on fab cycle time is difficult to quantify because it depends on the details of each fab's operational policies (How many steps ahead do you hold tools? Do you break setups?). Even simulation models can't accurately capture the impact of front-of-the-line hot lots because their occurrence is so case-specific.

Front-of-the-line hot lots (also called regular hot lots) are lots that are given a higher priority than others for dispatching. These lots are non-preemptive and do not require breaking setups or holding tools idle. They are sometimes stored in different-colored lot boxes to make them easier to identify. There may be multiple sub-classes of front-of-the-line hot lots (e.g. priority 0080, 0085, 0090, etc.).

It is possible to use a queueing formula to estimate the impact of front-of-the-line hot lots on the cycle time of regular lots. The approximation we use is discussed in Issue 19.03, as well as in FabTime's Cycle Time Management Course, and is included in our Operating Curve Spreadsheet. However, as with all queueing formulas, the approximation is best used as an estimate of long-term, average impact.

A prospective customer asked us this summer if we had a chart in FabTime that could show the actual impact of front-of-the-line hot lots on the cycle time of lots already in queue. They wanted this information so that they could show management the cost (in cycle time) of ever-increasing quantities of hot lots.

We didn't have a standard chart for this, but we thought it was a useful insight to capture, so we implemented a new Hot Lot Cycle Time Impact List chart. To calculate front-of-the-line hot lot cycle time impact, FabTime does the following:

1. Generate a list of Arrivals within the chart date range, for hot lots with the specified PriorityClass filter.
    - Any lots with ToolGroup=Undefined are excluded from this list.
    - Lots not matching the specified PriorityClass filter are assumed to be non-hot lots. (Note: these lots could be lower-priority hot lots, as long as the lots in the specified PriorityClass jump ahead of them.)

2. For each hot lot Arrival, search for the corresponding BeginRun with timestamp on or after the Arrival at the same Operation/Step.
    - It is assumed that BeginRun transactions will always be preceded by an Arrival transaction.
3. For each hot lot BeginRun, find the time of the subsequent BeginRun for any lot at the same ToolGroup.
4. For each hot lot, find any non-hot lots that were in queue for the same ToolGroup at the time of the hot lot Arrival, and that have not had a BeginRun prior to the hot lot BeginRun.
5. Approximate the delay of each of the non-hot lots as the delta between the time of the hot lot BeginRun and the time of the subsequent BeginRun (for any lot at the same ToolGroup).
    - Argument: The hot lot jumped ahead of the non-hot lots, thus delaying each of them. Each lot that arrived prior to the hot lot could possibly have started processing when the hot lot started processing but was delayed at a minimum to the subsequent BeginRun time.

Before showing examples from FabTime's software, let's work through some numerical examples that illustrate the approach taken for this metric.

Example 1: Single Tool, Single Lot Delayed

For our first example, assume in the chart below that Lot1 and Lot2 are non-hot lots, and Lot3 is a hot lot.

	8:00	9:00	10:00	11:00	12:00	13:00	14:00	Cycle Time
Lot 1	Queue	Process						3 hours
Lot 2		Queue				Process		6 hours
Lot 3 ***(HOT)***			Queue	Process				3 hours
								Total: 12 hours

- At 08:00, Lot1 arrives at Step1 (ToolGroup1).
- At 09:00, Lot1 begins running on Tool1. Lot2 arrives at Step1 (ToolGroup1).
- At 10:00, Lot3 (hot) arrives at Step1 (ToolGroup1).
- At 11:00, Lot1 completes running on Tool1. Lot3 (hot) begins running on Tool1, jumping ahead of Lot2.
- At 13:00, Lot3 (hot) completes running on Tool1. Lot2 begins running on Tool1.
- At 15:00, Lot2 completes running on Tool1.

In this example, Lot2 is delayed by two hours due to Lot3 (hot). This delay is computed as the delta between Lot3's BeginRun (11:00) and the time of the subsequent BeginRun for Lot2 (13:00).

Note that had Lot3 not been a hot lot, those additional two hours of queue time would have accrued to Lot3 instead of Lot2. Lot2 would have had a four-hour cycle time and Lot3 a five-hour cycle time. In both cases, the average cycle time is 4 hours (12 total hours divided by three lots). Front-of-the-line hot lots in general don't increase average cycle time. They just reallocate queue time from the hot lot to the regular lots. (Exceptions can occur if front-of-the-line hot lots cause smaller batching or extra setups.)

Example 2: Single Tool, Multiple Lots Delayed

As a second example, consider the expansion of the above scenario to four arriving lots to a single tool. At the top of the chart below, we see the sequence of queue and process times that would occur if none of the lots were hot, and the lots processed in first-in-first-out order. The total cycle time incurred is 18 hours (4.5 hours/lot, on average).

Single Tool, Multiple Lots Delayed

<table>
<tr><th></th><th>8:00</th><th>9:00</th><th>10:00</th><th>11:00</th><th>12:00</th><th>13:00</th><th>14:00</th><th>15:00</th><th>16:00</th><th>Cycle Time</th></tr>
<tr><td>Lot 1</td><td>Queue</td><td colspan="2">Process</td><td></td><td></td><td></td><td></td><td></td><td></td><td>3 hours</td></tr>
<tr><td>Lot 2</td><td></td><td colspan="2">Queue</td><td colspan="2">Process</td><td></td><td></td><td></td><td></td><td>4 hours</td></tr>
<tr><td>Lot 3</td><td></td><td></td><td colspan="3">Queue</td><td colspan="2">Process</td><td></td><td></td><td>5 hours</td></tr>
<tr><td>Lot 4 (not hot)</td><td></td><td></td><td></td><td colspan="4">Queue</td><td colspan="2">Process</td><td>6 hours</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Total: 18 hours</td></tr>
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<tr><th></th><th>8:00</th><th>9:00</th><th>10:00</th><th>11:00</th><th>12:00</th><th>13:00</th><th>14:00</th><th>15:00</th><th>16:00</th><th>Cycle Time</th></tr>
<tr><td>Lot 1</td><td>Queue</td><td colspan="2">Process</td><td></td><td>Text</td><td></td><td>Text</td><td></td><td></td><td>3 hours</td></tr>
<tr><td>Lot 2</td><td></td><td colspan="4">Queue</td><td colspan="2">Process</td><td></td><td></td><td>6 hours</td></tr>
<tr><td>Lot 3</td><td></td><td></td><td colspan="5">Queue</td><td colspan="2">Process</td><td>7 hours</td></tr>
<tr><td>Lot 4 (HOT)</td><td></td><td></td><td></td><td colspan="2">Process</td><td></td><td></td><td></td><td></td><td>2 hours</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Total: 18 hours</td></tr>
</table>

Cycle Time Impact of Hot Lot:
Lot 1: None
Lot 2: +2 hours
Lot 3: +2 hours

At the bottom of the chart, assume that Lot4 is a hot lot. Lot4 arrives after Lot2 and Lot3 are already in queue, just as Lot1 is completing processing. Lot4 is processed immediately, delaying both Lot2 and Lot3. The two-hour process time for Lot4 causes two hours of additional queue time each for Lot2 and Lot3. The total cycle time incurred across all four lots is still 18 hours, but the four hours of queue time that Lot4 would have incurred, if not hot, are divided equally between Lot2 and Lot3.

Example 3: Multiple Tools, Single Lot Delayed

Fair enough. But what happens if there are multiple tools in the tool group? In our third example, shown below, the top scenario shows a sequence of five lots, none of them hot, arriving to a tool group with two tools.

- At 08:00, Lot1 arrives at Step1 (ToolGroup1), but no tools are available.
- At 09:00, Both Tool1 and Tool2 become available. Lot1 begins running on Tool1. Lot2 arrives at Step1 (ToolGroup1) and immediately begins processing on Tool2.
- At 10:00, Lot3, Lot4, and Lot5 all arrive at Step1 (ToolGroup1).
- At 11:00, Lot1 completes running on Tool1 and Lot2 completes running on Tool2. Lot3 begins running on Tool1 and Lot4 on Tool2. Lot5 (non-hot in this scenario) waits in queue.

- At 13:00, Lot3 completes running on Tool1. Lot4 completes running on Tool2. Lot5 begins running on Tool1.
- At 15:00, Lot5 completes running on Tool1.
- The total cycle time for the five lots is 16 hours (3.2 hours/lot).

Two Tools, One Lot Delayed

	8:00	9:00	10:00	11:00	12:00	13:00	14:00	Cycle Time
Lot 1	Queue	Process on Tool 1						3 hours
Lot 2		Process on Tool 2						2 hours
Lot 3			Queue	Process on Tool 1				3 hours
Lot 4			Queue	Process on Tool 2				3 hours
Lot 5 (not hot)			Queue			Process on Tool 1		5 hours
								Total: 16 hours

	8:00	9:00	10:00	11:00	12:00	13:00	14:00	Cycle Time
Lot 1	Queue	Process on Tool 1						3 hours
Lot 2		Process on Tool 2						2 hours
Lot 3			Queue	Process on Tool 2				3 hours
Lot 4			Queue			Process on Tool 1		5 hours
Lot 5 (HOT)			Queue	Process on Tool 1				3 hours
								Total: 16 hours

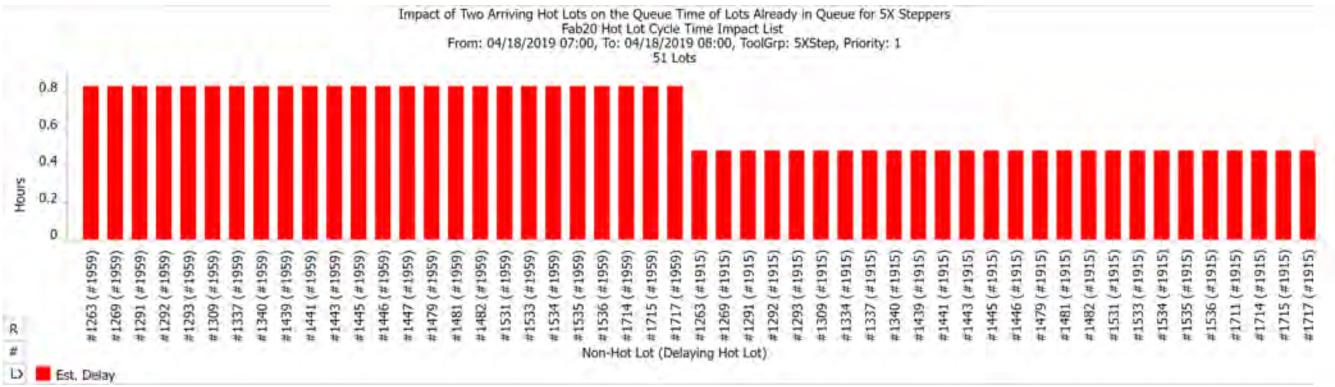
Cycle Time Impact of Hot Lot:
Lot 1: None
Lot 2: None
Lot 3: None
Lot 4: +2 Hours

At the bottom of the chart, everything is the same except that Lot5 is hot. Nothing changes until 11:00, when Tool1 becomes available, and Lot5 jumps ahead of Lot4 to be processed. Lot4's cycle time increases by Lot5's two-hour process time to five hours, while Lot5's cycle time decreases to three hours. The total cycle time remains 16 hours. The calculation of hot lot cycle time impact is done the same way as in the single tool case, by looking at the delta between the hot lot begin run (11:00) and the subsequent begin run of the lot displaced by the hot lot (Lot4's begin run at 13:00).

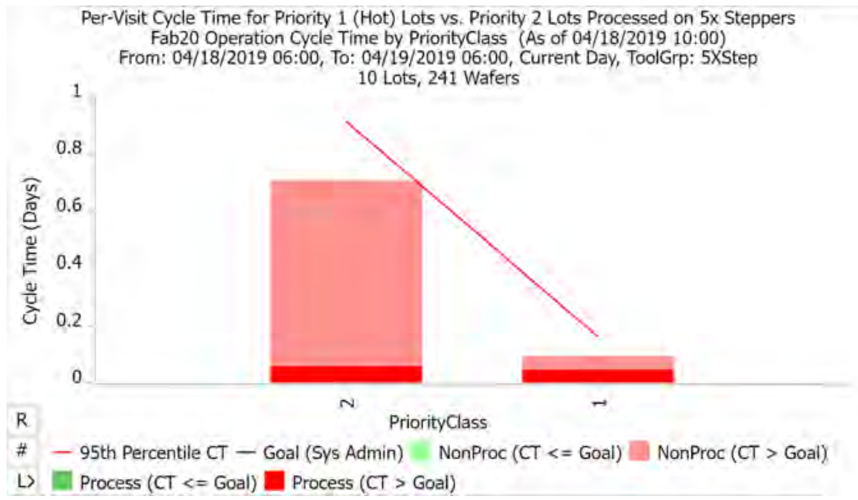
Example 4: Multiple Tools, Multiple Lots Delayed

The chart below, from FabTime's software, shows another example. In this case, two hot lots arrive at the 5x Stepper tool group during the one-hour time period of the chart. Each of these lots jumps the queue and delays the roughly 25 lots already in queue by the hot lot process time (~0.8 hours for the first lot and ~0.5 hours for the second lot).

It's tempting to look at this example, with so many lots already in queue, and think that the hot lot delay should be averaged across the other lots, rather than incurred for each lot. But consider: if each of these two hot lots had not jumped the queue, every lot already in queue when they arrived would have been processed 0.8 + 0.5 hours sooner. The extra queue time applies to each lot, not to the lots on average, just as it did in Example 2 above.



The chart to the right shows the average cycle time per visit through the 5x Stepper tool group, broken out by Priority 1 (hot) lots and Priority 2 (non-hot) lots. The Priority 1 lots incur only a tiny bit of queue time (the light red), primarily due to waiting for other hot lots, while the Priority 2 lots incur considerable queue time (some of it spent waiting for those Priority 1 lots).



Conclusions

Hot lots remain common in wafer fabs. Every fab we speak with has at least a few hot lots. The reason for this is that it's not cost-effective to lower a fab's utilization to the point that the overall average cycle time is very low. Instead, it makes economic sense to treat some small portion of WIP as hot, so that these lots can be processed at a lower cycle time (R&D lots, lots for key customers, etc.). When there is a small percentage of front-of-the-line hot lots, the impact of the hot lots on the regular lot cycle time is relatively small (basically amounting at the tool level to adding the hot lot process time to the cycle time of each non-hot lot that was waiting when the hot lot arrived).

The problem is that the percentage of hot lots can creep up over time. As the hot lot percentage gets higher, the impact on the regular lots is greater, and the resulting regular lot cycle times can become unacceptable. It can be difficult to understand the contribution of the hot lots to this increased cycle time if it can't be clearly seen in the data.

The Hot Lot Cycle Time Impact metric is intended to show people running the fab how hot lots drive up cycle time for many other lots. In Example 4 above, all 25 lots in queue incur the additional cycle time from the two hot lots that arrive. Such effects cascade through the fab, since hot lots are usually prioritized at every operation. We feel that this Hot Lot Cycle Time Impact metric is a valuable educational tool for fabs, and we are grateful to our prospective customer for having suggested it.

Closing Questions for Newsletter Subscribers

Do other subscribers capture this data on the cycle time impact of hot lots? What do you do with it?

Further Reading

For more about the cycle time impact of front of the line hot lots on other lots, see Issue 19.03 of the newsletter, Cycle Time and Hot Lots: Updated, available for download by subscribers (along with all past newsletter issues) from the FabTime Newsletter Archive (current password: FabTimeCommunity). The FabTime Operating Curve spreadsheet, which includes the ability to explore the impact of the percentage of front-of-the-line hot lots on regular lot cycle time, is available for download from the same page (above the table of past newsletter issues).

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- Arizona State University (5)
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