FabTime Cycle Time Management Newsletter

Volume 7, No. 2 February 2006

Information

Mission: To discuss issues relating to proactive wafer fab cycle time management

Publisher: FabTime Inc. FabTime sells cycle time management software for wafer fab managers. New features in this version (7.5) include a dispatch reservation system to hold downstream tools when a lot is started on an upstream tool and a new "Lot reaches Operation" alert.

Editor: Jennifer Robinson

Contributors: Mike Zhang (Intel); Dan Siems (Endevco); Hans Penninx (Philips); James Ignizio (Intel); and Ulrich Dierks (AMD)

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Welcome

Welcome to Volume 7, Number 2 of the FabTime Cycle Time Management Newsletter! This month we have two FabTime announcements, one about our new associate membership in the Fab Owners Association, and another concerning our enhanced lot dispatching module. We also have a call for papers for a special session on semiconductor manufacturing at the upcoming IEEE Conference on Automation Science and Engineering. Our FabTime software user tip of the month is about displaying zero-value objects on the move and WIP pareto charts. This month we have quite a bit of subscriber discussion, with multiple responses to last month's article about running development lots in a production fab. We also have multiple responses to James Ignizio's description of M-Ratio from last month's subscriber discussion forum.

In our main article this month we return to the ever-popular topic of operators. Specifically, we discuss some of the ways that operators can introduce variability into the fab and suggest metrics to capture and reduce this effect. It's a relatively short article, in honor of our shortest month (and because of the extensive subscriber discussion in this issue). We welcome your feedback.

Thanks for reading!—Jennifer

FabTime

Tel: (408) 549-9932
Fax: (408) 549-9941
www.FabTime.com
Sales@FabTime.com

Community News/Announcements

FabTime becomes Associate Member of Fab Owners Association

San Jose, CA – February 6, 2006. FabTime Inc. is pleased to announce our new associate membership in the Fab Owners Association (www.waferfabs.org). The FOA is a nonprofit, international association comprised of semiconductor and MEMS manufacturers and suppliers to our industry. They are headquartered in Cupertino, California. The FOA was conceived to provide a forum for Semiconductor manufacturing executives to discuss and act on common manufacturing issues resulting in company-wide efficiencies. The association was founded in 2004 and incorporated in 2005. Current FOA member companies include: AMI Semiconductor, Cypress, Delphi, Fairchild Semiconductor, Intersil, Jazz Semiconductor, LSI Logic, Micrel, ON Semiconductor, Spansion, and ZMD AG, as well as several associate members. You can read a recent article about the FOA in MICRO Magazine at http://www.micromagazine.com/archive/05/12/industrynews.html. FabTime's Jennifer Robinson spoke at the recent FOA quarterly meeting, held at Spansion's Submicron Development Center (SDC) in Sunnyvale, CA. All of the FOA device manufacturers are represented on the subscriber list of FabTime's cycle time management newsletter.

FabTime Dispatch Module

San Jose, CA – February 13, 2006. FabTime Inc. is pleased to announce recent enhancements to our lot dispatching module. FabTime's dispatching module is an add-on to our web-based digital dashboard software. At any point, for any tool in your fab, FabTime will show you the list of all lots qualified to run on that tool. This list will be ordered by the dispatching logic that your site has selected for that tool. This logic can use standard dispatch rules such as Priority-FIFO and Critical Ratio. However, you can also create custom dispatching logic using any combination of the following dispatch factors:

- Batch code at the current tool.
- Lot priority.
- Downstream tool priority.
- Current tool FIFO.
- Current tool idle time.
- Downstream batch efficiency.
- Critical ratio.
- Earliest-due-date.
- Current step processing time.
- Remaining processing time.
- Current step qualified tool count.
- Up to five other site-specific factors.

You can display dispatch lists in FabTime, and/or export them back to your MES. FabTime also includes a dispatch reservation system to hold downstream tools when a lot is started on an upstream tool, as well as dispatch performance reporting. FabTime's dispatch module can help you to:

- Ensure that wafers needed by management are in fact the wafers that are run, while requiring less manual intervention on the part of management.
- Improve delivery to schedule, and the display of performance to schedule.
- Document the dispatching logic used by the best operators and make this available to all shifts.

For more information, visit our website at www.FabTime.com or send us an email at sales@fabtime.com

Call for Papers: IEEE Conference on Automation Science and Engineering (Special Session on Semiconductor Manufacturing)

The second annual IEEE Conference on Automation Science and Engineering (IEEE CASE), sponsored by the IEEE Robotics and Automation Society, will be held on October 8 to 10, 2006 in Shanghai,

China. The goal is for broad coverage and dissemination of foundational research on automation among researchers, academicians, and industry practitioners. The focus is on scientific methods for automating machines and systems operating in structured environments over long periods, and also for the explicit structuring of environments. The first IEEE CASE was successfully held in 2005 in Edmonton, Canada. Papers describing original work on abstractions, algorithms, theories, methodologies, and case studies are invited. Detailed instructions for paper preparation and submission are available on the conference web site: http://www.ieee-case.org.

This conference includes an invited Session on Semiconductor Manufacturing. The conference organizers invite you to submit your original, significant and visionary papers describing scientific methods and technologies that improve efficiency and productivity of semiconductor manufacturing. The content could also present academic surveys and reviews that summarize state-of-the-art theories and practices in this arena. Special attention will be paid to papers focusing on integrating automation with decision technologies to provide eManufacturing solutions. Submissions of scientific results from experts in academia and industry worldwide are strongly encouraged. The special session will also include tours of Intel and SMIC manufacturing facilities in Shanghai, and a meeting with the Intel Alumni (Shanghai) Club. This announcement was submitted by Mike Zhang. For further information please contact mike.zhang@intel.com.

FabTime welcomes the opportunity to publish community announcements. Send them to newsletter@FabTime.com.

FabTime User Tip of the Month

Listing Zero-Value Objects on Move and WIP Pareto Charts

Most of the time, the pareto charts in FabTime display only columns for objects that have non-zero values. So, for example, if you generate a Scrap Pareto chart sliced by ToolGroup, and ToolGroup A had no scrap during the chart time period, then ToolGroup A will not appear on the chart. Sometimes, however, you need to see all of the objects on a chart displayed, even those with zero values. FabTime includes special code to let you do this for the Moves Pareto and WIP Pareto charts. For both of these charts, if you slice by an object-type (such as Area, for example) and put a specific list of items into the corresponding object filter (Areas in this example), there is logic in FabTime that says "the person asking for this data must really want to display all of these areas, so go ahead and include them on the x-axis even if you wouldn't otherwise do so because there are no moves or WIP."

There is one caveat to the above. This does not work if you include any wildcards (*) in

your filter. To generate, for example, a Moves by Segment chart in which all of a particular set of Segments are displayed (even those with no moves or WIP), you must list (separated by commas) each of the Segments that you want included, without wildcards, in the Segment filter. Although this can take time to set up, once you configure a chart and add it to your home page, your chart will be saved for the future.

If you have any questions about this feature (or any other software-related issues), just use the Feedback form in the software.

Subscriber Discussion Forum

Issue 7.01: Running Development Lots in a Production Fab

Dan Siems of Endevco wrote: "I read with interest the newsletter this month about running development wafers in the factory. Your explanations for the corrupting influence of development lots on factory cycle time are spot on! Here are the policy constraints I have implemented in my factory to crack this nut:

- ONE hot lot. (I'm a small wafer fab running about 150 wafers). NO exceptions. Ever. Don't even ask. The Customer Success Manager names the hot lot.
- The factory WIP (production wafers + development wafers + eng wafers + whatever else) is CAPPED at 150.
- Production gets 2/3 of the WIP (in wafers) to meet their commitments.
- Engineering (+ whoever else) gets the rest (1/3) of the WIP to do with whatever they want … with a catch. The engineering wafers that "finish" (this could occur anywhere in the process, depending on the intent of the experiment) and drop-off the WIP go into another inventory bucket – these wafers stay in this bucket UNTIL an engineering REPORT is written and entered in document control (after all, the intent of these wafers is to LEARN something). Engineering cannot start any wafers if this "finished processing but not finished drawing a conclusion" inventory bucket contains more than 15 wafers (about 5 lots). (This is the buffer that we tie the engineering starts rope to). An improvement to this would be to add an "aging" component to this "finished" engineering WIP.

The most important cycle time for a factory is its LEARNING CYCLE TIME. Fast factory cycle time helps this, but doesn't capture the "whole picture" of what it takes to drive improvement."

Another subscriber added: "Some additional reasons why our development lots have longer cycle time are the following:

- Pilot or lead wafers are needed at many steps.

■ Extra metrology data is taken at various steps. Engineers love all the data they can get."

Issue 7.01: Subscriber Discussion about M-Ratio

In last month's subscriber discussion forum, **James Ignizio (Intel)** mentioned the idea of using M-Ratio to drive cycle time improvement projects. He said: "When it comes to metrics and reporting, I'd strongly recommend the employment of the M-Ratio, which stands for Maintenance Ratio. This ratio provides an excellent picture of factory tool health. A symptom of a poorly performing fab is a ratio of scheduled to unscheduled downtime that is less than 9." After reading this issue, **Hans Penninx (Philips)** emailed to ask for further clarification regarding M-Ratio, and the statement that an M-Ratio should be higher than 9. Hans' example was "If for example a tool has a scheduled down time of 4% and the non scheduled down time is only 2% the ratio is still 2."

James was kind enough to clarify this issue. He said: "To answer, first of all the M-Ratio is the ratio of scheduled downtime in hours to unscheduled downtime in hours (i.e., rather than a ratio of percentage downtimes). Second, consider this illustration. Suppose a tool has an Availability of 90%. This means that, over a 168 hour week, it is down 16.8 hours. If it has, for example, an M-Ratio of 2 this means that 11.2 hours are caused by scheduled events (i.e., preventive maintenance) and the rest (5.6 hours) by unscheduled downs. That may not sound all that bad but realize that unscheduled downs are, by definition, not planned for. Further, if you examine the fundamental equations that drive factory behavior, you'll note that variability degrades factory performance. Unscheduled downs induce variability and thus degrade factory performance. It doesn't really take much additional variability (particularly if it is in the wrong place at the wrong time) to make a significant impact on performance. You can see this in the M-Ratio, the Waddington Effect, and ... ultimately ... in factory cycle time."

James further added, "To achieve a significant improvement in the M-Ratio requires a concentrated Manufacturing Science effort ---- first an educational effort, then implementation of several technical efforts devoted to reducing inefficiencies (e.g., variability) in the factory. There are, however, no silver bullets or magic wands. It takes the right people, with the right training, and the right leadership. Without those three elements there's not much that will be accomplished."

We also heard from **Ulrich Dierks at AMD** about this topic: "In the subscriber discussion Forum of Newsletter Volume 7 No.1 there was a statement of James Ignizio recommending M-Ratio (M-Ratio = Scheduled DownTime/ Unscheduled DownTime) as an excellent indicator of factory tool health. In this article the assertion was made that M-Ratios below 9 indicate a poorly performing fab. In parallel AMD & Spansion participated in a survey of SEMATECH called ISMI PM Efficiency Benchmark, where M-Ratio data for key tool groups was requested. The data we obtained for most of our tool groups were not in the range of the "Ignizio Target", even though availability of those groups was at a satisfactory level.

This led us to the impression that the M-Ratio target of 9 does not apply to the semiconductor industry, or at least not to our businesses. Certainly there are industries where 9 is in the right ballpark. Some others like e.g. steel blast furnaces or nuclear power plants should prefer to achieve higher M-Ratios. I think that just dividing SDT & UDT does not really tell the whole story. Most of the UDT of our Equipment is not caused by mechanical parts failure, which could have been avoided by a shorter PM cycle, but is caused by a device, e.g. a target etc., which

has reached its end of life by losing the ability to process within spec. As this is not exactly predictable, and often highly variant, it is not reasonable from an availability point of view to change this device after its minimal life time has been elapsed.

In my opinion, the M-Ratio is interesting for tracking over time by tool group, and monitoring improvement or deterioration, but the optimal M-Ratio level needs to be determined by maximum tool availability. Increasing availability at bottlenecks increases capacity and reduces wafer cost, and at non bottlenecks it also helps CT. I think that we should drive for improved availability first, and work on M-Ratio second.

FabTime Response: We would like to thank Hans for seeking clarification of this metric, and to thank James for taking the time to share his expertise. We also referred Ulrich to James Ignizio's response above regarding M-Ratio targets. But we do tend to agree with Ulrich that M-Ratios of 9 are quite aggressive, relative to what people are saying to us about fab downtime and maintenance characteristics. We think that M-Ratio is a useful metric that is worth beginning to track, in addition to availability, and we agree with James that improvements in M-Ratio will tend to reduce variability in the fab (and hence improve cycle time). We also agree with Ulrich that it is very important to maintain a focus on availability numbers, for both cycle time and capacity improvement. We welcome further feedback on this topic from other subscribers.

Operator Variability and Cycle Time

Introduction

As we have discussed many times in this newsletter, a relatively low cost path to wafer fab cycle time improvement lies in identifying and removing sources of variability. There are many sources of variability in the fab, and we have discussed a number of them in recent issues. In this article, we will discuss the fab variability that is contributed by operators. Any time a fab depends on people to move lots in or out of operations, or perform setups, or log transactions, or transfer lots between operations, some amount of variability is automatically introduced. In this article, we will discuss some of the ways that operators introduce variability into the fab and suggest metrics to capture and reduce this effect.

Operators are People Too

The thing that we have to remember is that operators are people, not machines. This can result in any of following sources of variability:

- Shift change, breaks, meetings, paperwork, and training courses all reduce the time that the operator is available to load lots onto tools. Some of these things are highly predictable in when they occur, but others add more randomness. Any time that the operator is not available can lead to lost capacity on tools.

- Manual transport by operators can add to delays, if operators group lots onto carts for transport. There is a natural human tendency to want to reduce the number of trips, and wait until a few lots stack up. This introduces variability while the lots are waiting for the cart to be moved, and again when the full cart must be unloaded downstream.

- Operators may sometimes make dispatching decisions for convenience, at a cost to cycle time. For example, they might prefer a particular tool to others in the group, because of its location or ease of use, leaving the less convenient tools underutilized.

- Metrics systems in fabs may drive operators to make choices that optimize some local metric, but are detrimental to the fab as a whole. This is most commonly seen when the primary metric is moves. This can influence operators to make the "easy moves" first, favoring lots with the shortest process time, or lots that require fewer tests. Operators may also wish to avoid manufacturing time lost due to setups, and hence inflict long delays on lots of less common setup IDs.

All of the above situations may contribute to fab cycle times. But the real problem with operator variability is that people cannot be in two places at one time. In many cases, an operator is responsible for more than one machine. This is because the operator is only needed for part of the process time (typically the load and unload times), and can be off doing something else productive on another tool during the remaining process time.

What ends up happening in practice, more often than we would like, is that more than one machine requires the operator's attention at the same time. Call it variability. Call it Murphy's Law. But if the operator is responsible for running three separate tools, we may be sure that at some point, two of the tools will be ready to unload, while the third is ready to load. And the operator will have to decide which one to attend to first, leaving the others to wait a few minutes. This is not the operator's fault, of course, but is an unfortunate outcome of sharing operators across tools in a highly variable environment. Short of assigning a single operator to stand in front of each individual tool in the fab (hardly an option!), we will have to live with this situation. What we can do, however, is look at some metrics and recommendations for mitigating the effect.

Operator-Related Metrics

Operator Utilization:

Though not used extensively, operator utilization can be estimated for planning purposes using methods similar to those of capacity planning, using the following steps:

1. Calculate the number of lot (or batch) moves required per operator.

2. Estimate the average time that the operator is required for each lot or batch move.

3. Multiply the above to get total time that the operator is needed.

4. Determine the amount of time that each operator is available to work (after accounting for planned breaks, meetings, etc.).

5. Divide 3 into 4 to get the operator utilization.

Many fabs, even if not formally calculating operator utilization, use an estimate of moves per operator (operator productivity) to set the number of operators. Looking at relative operator utilization values by area or tool type may give some indication of

which operators are most likely to have a significant impact on cycle time. As with tools, a higher operator utilization will be correlated, non-linearly, with higher per-visit cycle times.

In our cycle time management training class we have a simulation example in which a single operator is approximately 80% utilized, and is responsible for running four tools, each loaded to 85% of capacity. The observed cycle time x-factor for this system is 6. If the system were not operator constrained (if we re-simulate with no operator requirements), the observed cycle time x-factor is 2. That is, the operator constraint on this system, from having a single, highly loaded operator running four tools, causes the average cycle time of lots to triple!

Number of Tools Run per Operator: The more tools, or types of tasks, that an operator is responsible for, the more likely the operator is to be needed in more than one place at one time. At furnace steps operators can usually schedule batches to be completed at different times, but with shorter process times, this is more difficult. There are trade-offs to operator cross-qualification, too. Having a single operator dedicated to a few tools is like the case with dedicated tools – no coverage when the operator is busy. Having operators who can work on many tools, however, means more distractions, more chance of being needed in two places at once. Still, number of tools run per operator can be a relative indicator of which tool types are likely to have operator problems.

Standby WIP Waiting Time on Tools: A more direct indicator of where staffing is likely to cause cycle time problems is "standby WIP waiting" time on tools. This is time that the tool is available (up and ready to run), and WIP is available and waiting to be processed on the tool, but for some reason the tool remains idle. Usually, the reason for this is that the operator was busy doing something else, and could not load the tool. "Waiting for unload" time, if available from the MES, is a similar metric, indicating that the lot has finished processing, but no operator was available to remove it. Both of these metrics indicate lost capacity on the tool, and added cycle time for lots, caused solely by the fact that the operator could not be there to load or unload the tool. Looking at "standby WIP waiting" and "waiting for unload" times by tool can give a strong indication of where staffing issues are most likely to contribute to cycle time.

Recommendations

We do have a few recommendations for mitigating the impact of operator variability on cycle time, especially when given the above data regarding operator utilization values, number of tools per operator, and "standby WIP waiting" or "waiting for unload" times.

- Minimize the number of different tools that each operator or technician monitors at one time, at least for bottleneck tool groups.
- Measure the time that tools spend idle with WIP ready, or finished but waiting to unload. Review this data for bottleneck tools, especially, and revisit staffing decisions accordingly. Note that this operator-induced delay can move a tool group up to the steep part of the operating curve, and have a significant effect on cycle times. Supervisors should reassign operators if possible where this occurs. Use operator utilization values, if available, to get an idea of which tool types have operators that could be spared for work elsewhere.
- Stagger break schedules where possible, especially on bottleneck tools. Some fabs stagger shift change, to ensure coverage.
- Avoid having a single person trained to do a job – this is the same as having a single path operation that causes problems when the tool is unavailable.

Sidebar: Exercise for FabTime Software Users

If you have FabTime's software (and if tool qualification data is mapped to FabTime from your MES), you can look at the percentage of "standby WIP waiting" time on your bottleneck tools.

1. Generate the Tool State Pareto chart.

2. Filter the chart for some critical set of tools (filter by area, or enter a key toolgroup in the toolgroup filter)

3. Change the time frame to be for the past week, and change the slice variable to tool.

The dark gray color on the chart is "standby WIP waiting" time for each tool. The lighter gray color is standby time when no WIP was waiting – the tool was idle because there was nothing to process. Contact FabTime if you have questions about this data for your fab.

Conclusions

Operators, or in some cases the lack of operators, contribute to variability in the fab in a number of ways. The most significant of these occurs when a single operator is shared across multiple tools, and cannot be in more than one place at one time. If two tools are ready for the operator at the same time, one of them will have to wait, leading to lost capacity and increased cycle time. This lost capacity can be estimated by measuring "standby WIP waiting" or "waiting for unload" times on tools. Other less direct metrics that may also indicate the relative impact of operators on fab variability include operator utilization and number of tools run per operator. Anything that can be done to understand the variability introduced by operators, and to mitigate the effect, will drive the fab towards improved cycle times.

Closing Questions for FabTime Subscribers

Do you measure lost capacity on your tools that is due to an operator not being available? Do you have other ways that you measure the variability contributed by operators to your fab? Do you have other suggestions for minimizing this variability?

Further Reading

- F. Chance and J. Robinson, "The Impact of Staffing on Cycle Time," *FabTime Cycle Time Management Newsletter*, Volume 3, Number 9, 2002. In this issue of FabTime's newsletter, we presented simulation results showing the impact on cycle time of forced idle time due to operator delays. While past issues of the newsletter are generally reserved for FabTime software customers, we will make this particular issue available to current newsletter subscribers for the next month, at no charge. Email Jennifer.Robinson-@FabTime.com to request a PDF copy.

- H-N Chen and R. Dabbas, "Modeling Staffing Requirements within a Semiconductor Manufacturing Environment," *Proceedings of the 2002 Advanced Semiconductor Manufacturing Conference*, Boston, MA, 234-239, 2002. This paper describes a Motorola in-house project to build a staffing model with static capacity, queueing, and simulation. A PDF of the presentation from this paper can be requested from Jennifer.Robinson-@FabTime.com.

- H. Gold, "A Simple Queueing Model for the Estimation of Man Machine Interference in Semiconductor Wafer Fabrication," *Operations Research Proceedings 2001 (OR 2001)*, Duisburg, Germany, September 2001. In this paper a simple queueing model to deal with the man machine interference problem in semiconductor manufacturing is developed. A PDF of this paper can be requested from Jennifer.Robinson@FabTime.com.

- R. C. Kotcher, "How "Overstaffing" at Bottleneck Machines Can Unleash Extra Capacity," *Proceedings of the 2001 Winter Simulation Conference*, Washington, D.C., 1163-1169, 2001. Using simulation,

Headway Technologies predicted that increasing staffing among a group of already lightly loaded machine operators (overstaffing) would significantly improve throughput of its factory. This paper can be downloaded from www.informs-cs.org/wscpapers.html.

- J. Robinson and F. Chance, "In-Depth Guide to Operators and Cycle Time", *FabTime Cycle Time Management Newsletter*, Volume 4, Number 6, 2003. While past issues of the newsletter are generally reserved for FabTime software customers, we will make this particular issue available to current newsletter subscribers for the next month, at no charge. Email Jennifer.Robinson-@FabTime.com to request a PDF copy.

Subscriber List

Total number of subscribers: 1976, from 437 companies and universities. 22 consultants.

Top 10 subscribing companies:

- Intel Corporation (113)
- Analog Devices (77)
- Infineon Technologies (67)
- Freescale Semiconductor (60)
- Atmel Semiconductor (59)
- STMicroelectronics (58)
- Micron Technology (55)
- Texas Instruments (49)
- Philips (48)
- TECH Semiconductor (43)

Top 3 subscribing universities:

- Virginia Tech (10)
- Arizona State University (8)
- Ben Guiron Univ. of the Negev (7)

New companies and universities this month:

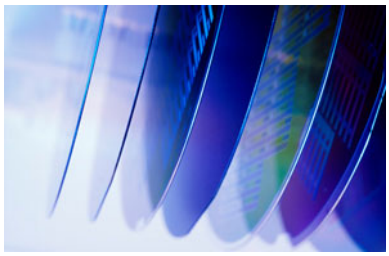
- Alchimer Coating Solutions
- Froedtert Hospital
- M/A-COM / Tyco Electronics
- Northrop Grumman Corporation
- ORT Montenegro Advocacy Program
- Proeza TI
- Qualcomm MEMS Technologies
- San Francisco State University
- Systron Donner
- Tekab Co. Ltd.

Note: Inclusion in the subscriber profile for this newsletter indicates an interest, on the part of individual subscribers, in cycle time management. It does not imply any endorsement of FabTime or its products by any individual or his or her company.

There is no charge to subscribe and receive the current issue of the newsletter each month. Past issues of the newsletter are currently only available to customers of FabTime's web-based digital dashboard software or cycle time management course.

To subscribe to the newsletter, send email to newsletter@FabTime.com, or use the form at www.FabTime.com/newsletter.htm. To unsubscribe, send email to newsletter@FabTime.com with "Unsubscribe" in the subject. FabTime will not, under any circumstances, give your email address or other contact information to anyone outside of FabTime without your permission.

FabTime® Dispatching Module



Dispatch Configuration

Configuration projects are quoted on a fixed price basis for each site, and typically include:

- Dispatch rule and factor configuration.
- Training.
- Dispatch list feed to the MES (if applicable).

Dispatch Factors

- Batch code at the current tool.
- Lot priority.
- Downstream tool priority.
- Current tool FIFO.
- Current tool idle time.
- Downstream batch efficiency.
- Critical ratio.
- Earliest-due-date.
- Current step processing time.
- Remaining processing time.
- Current step qualified tool count.
- Up to five other site-specific factors.

Interested?

Contact FabTime for technical details.

FabTime Inc.
Phone: +1 (408) 549-9932
Fax: +1 (408) 549-9941
Email: Sales@FabTime.com
Web: www.FabTime.com

Do your operators make the best possible dispatching decisions?

- Do you struggle to balance lot priorities and due dates with tool utilization and moves goals?
- Do your critical bottleneck tools ever starve?
- Do you use standard dispatch rules, but feel that your fab's situation is more complex, requiring custom blended rules?
- Do you know how well your fab executes your dispatching strategy?

FabTime's dispatching module is an add-on to our **web-based digital dashboard software**. At any point, for any tool in your fab, FabTime will show you the list of all lots qualified to run on that tool. This list will be ordered by the dispatching logic that your site has selected for that tool. This logic can use standard dispatch rules such as Priority-FIFO and Critical Ratio. However, you can also create custom dispatching logic using any combination of dispatch factors (shown to the left).

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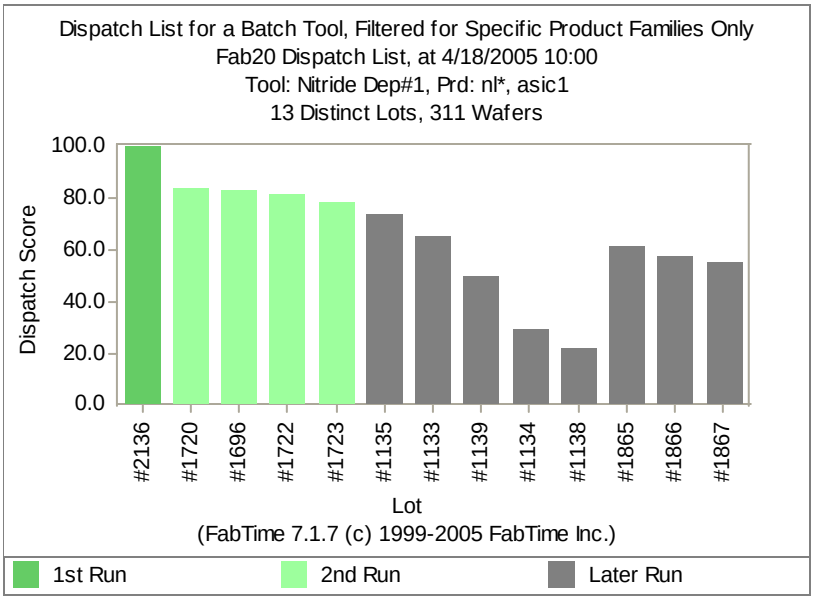

FabTime Dispatching Module Benefits

- Ensure that wafers needed by management are in fact the wafers that are run, while requiring less manual intervention on the part of management.
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