FabTime Cycle Time Management Newsletter

Volume 10, No. 1 January 2009

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 month include speed improvements for initial entry to tool-state charts and the ability for end-users to create and share custom charts.

Editor: Jennifer Robinson

Contributors: Professor Scott Mason (University of Arkansas)

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Welcome

Welcome to Volume 10, Number 1 of the FabTime Cycle Time Management Newsletter! This is the start of our 10th year of publication, and our 90th issue. We are grateful to our loyal subscribers, and we wish you all the best in these difficult economic times. In this issue, we have two community announcements, one about a special issue of Future Fab magazine, and the other a call for papers for the next MASM conference. Our software user tip of the month is about analyzing MTBF and MTTR data in FabTime. We have no subscriber discussion this month, but we have listed some recent topics, and welcome your feedback for future issues.

In our main article this month, we return to a topic addressed in Volume 9, Number 9, controlling WIP in the fab. In that previous article, we discussed the management of WIP bubbles. In this article, we discuss setting goals for WIP in the fab as a whole, and by area, and the tracking of the absolute delta from WIP goals as a measure of variability. We also discuss the importance of ensuring that WIP goals are consistent with other fab goals, and illustrate this with a detailed example. While WIP levels are probably declining right now in many fabs, we reiterate the point from last month that a downturn is a good time to focus on fundamentals. Understanding and tracking your WIP levels in more detail is a good place to start.

Thanks for reading!—Jennifer

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Community News/Announcements

Special ITRS Issue of Future Fab Magazine Available

We received this announcement about a new issue of Future Fab Magazine, and the ITRS connection made us decide to share the announcement with you all:

"Presenting a new annual ITRS edition of Future Fab – our first issue of this year! Let us take this opportunity to thank issue sponsors. Without their continued support in these difficult times, we would not be able to bring you this Special Focus Edition: International Technology Roadmap for Semiconductors.

This issue brings you articles written for Future Fab by all of the ITRS Technology Working Groups (TWGs). These executive summaries provide an overview of the work that each TWG is tackling. At the end of each synopsis you'll find a link that takes you back to the ITRS site for complete details.

The Future Fab ITRS Annual Issue begins with an introduction from ITRS Chairman and Future Fab Panel Member, Dr. Paolo Gargini, Intel Fellow and Director of Technology Strategy for Intel Corp., and follows up with articles which present cutting-edge opinion and research on ITRS-sponsored initiatives ranging from ESH issues to wireless and mobile, and from metrology to front end processes."

The issue is available for download from http://www.future-fab.com/. Download is free, but requires a brief registration process.

Call for Papers: 2009 Modeling and Analysis of Semiconductor Manufacturing Conference (MASM 2009)

We received a call for papers from Scott Mason, one of the three conference organizers (with Ricki Ingalls from Oklahoma State University and Shekar Krishnaswamy from AMD), for MASM 2009. We are providing an abridged version of the announcement here.

The 2009 International Conference on Modeling and Analysis of Semiconductor Manufacturing (MASM) will again be a forum for the exchange of ideas and best practices between researchers and practitioners from around the world involved in modeling and analysis of high-tech manufacturing systems. We are convinced of the worth and importance of the continuation of the MASM events held in Tempe, Arizona in 2000 and 2002, Singapore in 2005, and Miami, Florida in 2008.

The MASM 2009 conference will be fully contained within the Winter Simulation Conference 2009 (WSC '09), the leading conference in discrete event simulation (http://www.wintersim.org). WSC '09 features a comprehensive program ranging from introductory tutorials to state-of-the-art research and practice. WSC will take place in Austin, Texas, USA from December 13th to 16th. All attendees of the MASM conference will register for WSC at the same cost. All participants of the WSC can attend MASM 2009 sessions. WSC '09 will be held at the Hilton Austin Hotel, December 13th-16th.

While we seek to know the current semiconductor industry state-of-the-art, neither presenters nor attendees need to be in the semiconductor industry to participate. We are interested in any methodologies, research, and/or applications from other industries such as TFT-LCD, flexible displays, and bio-chip that might also be utilized for the semiconductor industry, and vice versa.

The conference will be built around the following three tracks:

1. Operational Modeling and Simulation
2. Supply Chain Management and Fab Economics

3. Enabling Computing Techniques and Statistical Methods

Details about paper submission can be found at www.wintersim.org/MASM.htm. The deadline for paper submission is April 6, 2009.

FabTime welcomes the opportunity to publish community announcements, including conference notices and calls for papers. Send them to newsletter@FabTime.com.

FabTime User Tip of the Month

Analyze MTBF Data in FabTime

A FabTime user contacted us recently to ask where mean time between failure (MTBF) data was located in FabTime. We thought that others might share this question, and decided to discuss MTBF and MTTR (mean time to repair) data in FabTime. Both can be found in the data table of the Tool Downtime Duration CV Trend and Pareto charts, available from the Tool Downtime Charts category on the Charts page. The reason their location can be slightly difficult to find is that MTBF and MTTR are not shown on the chart itself. They are, however, available in the data table. This is because there are a number of data series involved. MTBF and MTTR are reported separately for scheduled downtime events vs. unscheduled downtime events. For each type of downtime (scheduled and unscheduled), FabTime displays:

Count: The number of scheduled or unscheduled downtimes that ended during the time period.

Between (hours): The mean time between downtimes occurring on any tool in the group (e.g. if this value is 2 hours, this means that every two hours, one of the tools included in the group completed a downtime event). Note that the time that the tool is down IS included in the time between downtime events.

Between per Tool (hours): The mean time between downtimes occurring on each tool. (e.g. if this value is 12 hours, this means that each tool in the group completed a downtime event, on average, every 12 hours)

Duration (hours): The average duration of the downtime events reported during the period (MTTR).

Duration CV: The coefficient of variation of the downtime durations during the period.

FabTime counts a downtime (scheduled or unscheduled) when it ends within a period. For a group of tools, FabTime calculates mean-time-between downtimes as the period length divided by the number of downtimes. For a single tool, FabTime calculates mean-time-between downtimes as the group mean-time-between downtime multiplied by the number of tools. If the number of downtimes within a period is zero or one, FabTime sets the mean-time-between downtimes (for both a group of tools and for individual tools) to the period length. FabTime includes the total downtime in the duration, even if a portion of the downtime falls outside the period. FabTime calculates the average duration as the sum of durations for individual downtimes during the period divided by the number of downtimes. Coefficient of variation (CV) of duration is standard deviation of duration divided by average duration. Coefficient of variation is a measure of how consistent the downtimes are from one to the next.

You'll find this data most useful when generated for a set of like tools, over a relatively long time period (perhaps a month or more). The resulting MTBF/MTTR data can be used to populate simulation models, or to compare with the expected performance of the tool. An example of FabTime's MTBF/MTTR data tracked by week, for four weeks, for a tool group with six tools, is shown below.

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

Start Time	End Time	Sched Down Count	Sched Down Between (Hours)	Sched Down Between per Tool (Hours)	Sched Down Duration (Hours)	Sched Down Duration CV	Unsched Down Count	Unsched Down Between (Hours)	Unsched Down Between per Tool (Hours)	Unsched Down Duration (Hours)	Unsched Down Duration CV
(Hide)	(Hide)	(Hide)	(Hide)	(Hide)	(Hide)	(Hide)	(Hide)	(Hide)	(Hide)	(Hide)	(Hide)
Apr 13 06:00 Area	Apr 18 10:00	33	5.09	30.55	0.97	0.48	63	2.67	16	3.76	0.91
Apr 6 06:00 Area	Apr 13 06:00	41	4.1	24.59	1.02	0.35	82	2.05	12.29	4.75	0.82
Mar 30 06:00 Area	Apr 6 06:00	45	3.73	22.4	1.1	0.44	84	2	12	3.69	0.86
Mar 23 06:00 Area	Mar 30 06:00	44	3.82	22.91	1.07	0.42	79	2.13	12.76	4.46	1.19

Subscriber Discussion Forum

We have no subscriber discussion this month. Recent topics that have come up, which readers might want to weigh in on, include:

- The implementation of lean manufacturing techniques in wafer fabs (particularly success stories).
- Short-term simulation of fab dynamics.
- Implementation experiences for dynamic x-factor.
- Definitions for real-time line yield metrics.

Plus our most recent newsletter topics:

- Improving Cycle Time during a Downturn, Redux
- WIP Bubbles in Wafer Fabs
- Tool State Calculations for Cluster Tools in Fabs

FabTime welcomes the opportunity to publish subscriber discussion questions and responses. Send your questions or comments to Jennifer.Robinson-@FabTime.com.

Setting WIP Goals in Wafer Fabs

Introduction

A topic that comes up from time to time among our subscribers is that of setting WIP (work in process) goals. A WIP goal is a bit different from a moves goal or a scrap goal. With WIP goals, you typically want performance to remain within a particular target band - not getting too much higher than the goal, and not going too much lower. An approach that we recommend is setting a target WIP goal (by fab and by area), and then measuring the absolute delta to that WIP goal. We discussed ways to do this with FabTime in the tip of the month in Issue 9.09. But how should the average WIP goal be set in the first place? In this article, we discuss setting WIP goals that are consistent with other fab performance metrics.

Little's Law: The Relationship between Cycle Time, Throughput and WIP

The setting of WIP goals cannot be separated from the setting of cycle time and throughput targets. The relationship between cycle time, throughput, and WIP was first documented in 1961 by J. D. C. Little. Little's Law states that at a given throughput level, the ratio of WIP to cycle time equals throughput, as shown in the formulas below. (This section was adapted from Issue 1.3 of the newsletter, and our cycle time course material)

*WIP = Throughput * Cycle Time*
Throughput = WIP / Cycle Time
Cycle Time = WIP / Throughput

In other words, for a factory with constant throughput, WIP and cycle time are proportional. Here is an intuitive explanation that shows why WIP must be equal to throughput rate times cycle time.

Suppose you have a small factory, where the average factory cycle time is 3 weeks, and the factory is initially empty. Every Monday morning 100 wafers are released into the factory. In this case:

- In week 1 there are 100 wafers in the factory.
- In week 2 there are 200 wafers in the factory (the 100 that you just started, plus the 100 that are there because they haven't finished processing).
- In week 3 there are 300 wafers in the factory (the new 100 wafers, plus the 200 that haven't finished processing).
- At the end of week 3 (and every week thereafter), 100 wafers exit the factory and 100 new wafers are started. Thus the WIP is always 300 wafers (100 wafers * 3 weeks).

Now suppose that demand increases, so starts are increased to 150 wafers per week. And suppose that with more work in the factory, average cycle time rises to 5 weeks. Looking again by week, we have:

Week 1: 150 wafers WIP
Week 2: 300 wafers WIP
Week 3: 450 wafers WIP
Week 4: 600 wafers WIP
Week 5 (and every week thereafter): 750 wafers WIP (150 wafers times 5 weeks of cycle time).

We can see in both of these cases that, when we look at the WIP that is required in the fab to support the throughput rate, that WIP is equal to the start rate times the cycle time.

To apply this rule of thumb to a larger fab, suppose we have a fab that is starting 5,000 wafers per week, and is running a 10-week cycle time on average. We can immediately estimate that:

*WIP = (5000 wafers per week) * (10 weeks) = 50,000 wafers.*

We do have to adjust the above estimate for yield loss, however. If we start 5000 wafers per week, and 10% of those wafers are scrapped by the time that they leave the fab, then our throughput rate will only be 4500 wafers per week. Applying Little's Law to the start rate results in a WIP estimate of 50,000 wafers. Applying Little's Law to the throughput rate, however, results in a WIP estimate of 4500 wafers/week * 10 weeks = 45,000 wafers. The real WIP number lies in between these two values, because wafers are scrapped throughout the process. If scrap is distributed relatively linearly through the line, we can take the midpoint of these two values, and estimate the WIP as 47,500 wafers. More formally:

*WIP = Start Rate * Cycle Time of Shipped Lots * Yield Correction*

where

Yield Correction = (1 + Line Yield)/2

This yield correction assumes that the scrap occurs linearly across the line (or, equivalently, all occurs at the mid-point of the line). Applying this formula to our example, we get WIP = 5000 wafers/week * 10 weeks * (1+0.9)/2 = 5000*10*0.95 = 47,500 wafers.

Another nice rule of thumb that immediately comes from Little's Law:

If you can cut cycle time by 10%, you should see a corresponding 10% reduction in WIP (where YC = Yield Correction):

*OldWIP = (start rate) * (old cycle time) * YC*

*NewWIP = (start rate) * (new cycle time) * YC*

*= (start rate) * (old cycle time * 90%) * YC*

*= 90% * (start rate) * (old cycle time) * YC*

*= 90% * OldWIP.*

Keep in mind that Little's Law doesn't say that WIP and cycle time are independent of start rate. Little's Law just says if you have 2 of these three numbers, you should be able to solve for the remaining one. The tricky part is that cycle time and WIP are really functions of the start rate. So changing the start rate in fact changes all three parameters, but Little's Law should hold for the new numbers.

In our context of goal-setting, Little's Law means that if you have a known start rate and line yield, and you have a target cycle time, then these values together determine your average WIP. The only way to reduce this average WIP is to either reduce the start rate or take actions to reduce cycle time and WIP together. (Well, you could technically reduce your average WIP by scrapping more wafers, that's not a very good long-term solution).

The Relationships between WIP, Moves, Turns and Cycle Time

It's important to make sure that your WIP target is consistent with your turns and moves targets. As discussed above, a cycle time target, combined with a start rate, determines expected average WIP. Start rate, number of steps, and line yield also can be used to obtain a rough estimate of a fab's moves goal. For example, suppose in our 5,000 wafer start per week fab we have a weighted average of 420 steps per route. To maintain steady state 5000 wafers must complete 420 steps each week, on average. As with the Little's Law calculation, however, we need to adjust for the wafers that are scrapped, and hence don't need to be moved. Using the same type of linear yield correction applied previously, we have:

*Average Moves = Start Rate * Number of Steps * Yield Correction*

where Yield Correction is again equal to (1 + Line Yield / 2).

In this example, average moves = 5,000 wafers/week*420 moves/wafer*(1+0.9)/2 = 5,000*420*.95 = 1995000 moves/week = 285,000 moves/day (assuming 7 by 24 operation)

Once we have a goal for average WIP, this, combined with our moves goal, determines the fab's target turns rate, where Turns = Moves / Starting WIP for a time period. WIP turns measures how many times per day, on average, each wafer is moved. The turns rate is also an early indicator of a fab's cycle time. If we know how many times per day we move each wafer, and we know how many steps the wafer goes through, then we know, in effect, how long the cycle time will be.

Continuing the example above, suppose we have a fab with 47,500 wafers in WIP, and the fab performs 285,000 moves/day. The turns rate is 285,000/47,500 = 6. On average, each wafer is moved 6 times per day. If the weighted average process flow is 420 steps, and we move each wafer 6 times per day, then the expected cycle time for the fab is 420 steps / 6 steps/day = 70 days = 10 weeks.

Note that this worked out exactly to match the 10 week cycle time that was an input for the Little's Law calculation above. Here's why (where *YC = Yield Correction*):

From Little's Law we have *(1) Start Rate * CT * YC = WIP*

We also have the definition of WIP Turns:

(2) Turns = Moves / WIP

This can be re-written as:

(3) WIP = Moves / Turns

Substituting (3) into the right-hand side of (1) we get

*(4) Start Rate * CT * Yield Correction = Moves / Turns*

But we also have our definition for moves, *(5) Moves = Start Rate * Number of Steps * YC.*

Substituting (5) into the top of the right-hand side of (4) we get

*(6) Start Rate * CT * YC = Start Rate * Number of Steps * YC / Turns*

Cancelling and rearranging terms, this simplifies to:

(7) CT = Steps / Turns

And thus, we can start with the cycle time used in the Little's Law calculation, and use the definitions of Moves and WIP Turns to simplify to get the definition of cycle time used in the turns calculation. Please note that this is not a formal proof. The yield corrections, in particular, are approximate. And the number of steps obviously varies across flows, so that a weighted average must be used, and this changes as product mix changes. The point is, however, that WIP goals, turns goals, and moves goals are all connected, and cannot be set in isolation from one another. If you try to arbitrarily reduce WIP, without making any fundamental improvements that will also reduce cycle time, then throughput will eventually fall. Possibly this is the reason that most Kanban implementations in wafer fabs are not successful – when limits on WIP are imposed via Kanbans, unless equipment variability is dramatically improved (a very hard task), the decrease in WIP leads to decreased throughput… and urgent calls to increase the number of Kanbans. Given enough Kanbans, WIP levels rise and buffer the fab against equipment variability, throughput rises again, and the Kanban system is eventually discarded.

WIP Goals by Area

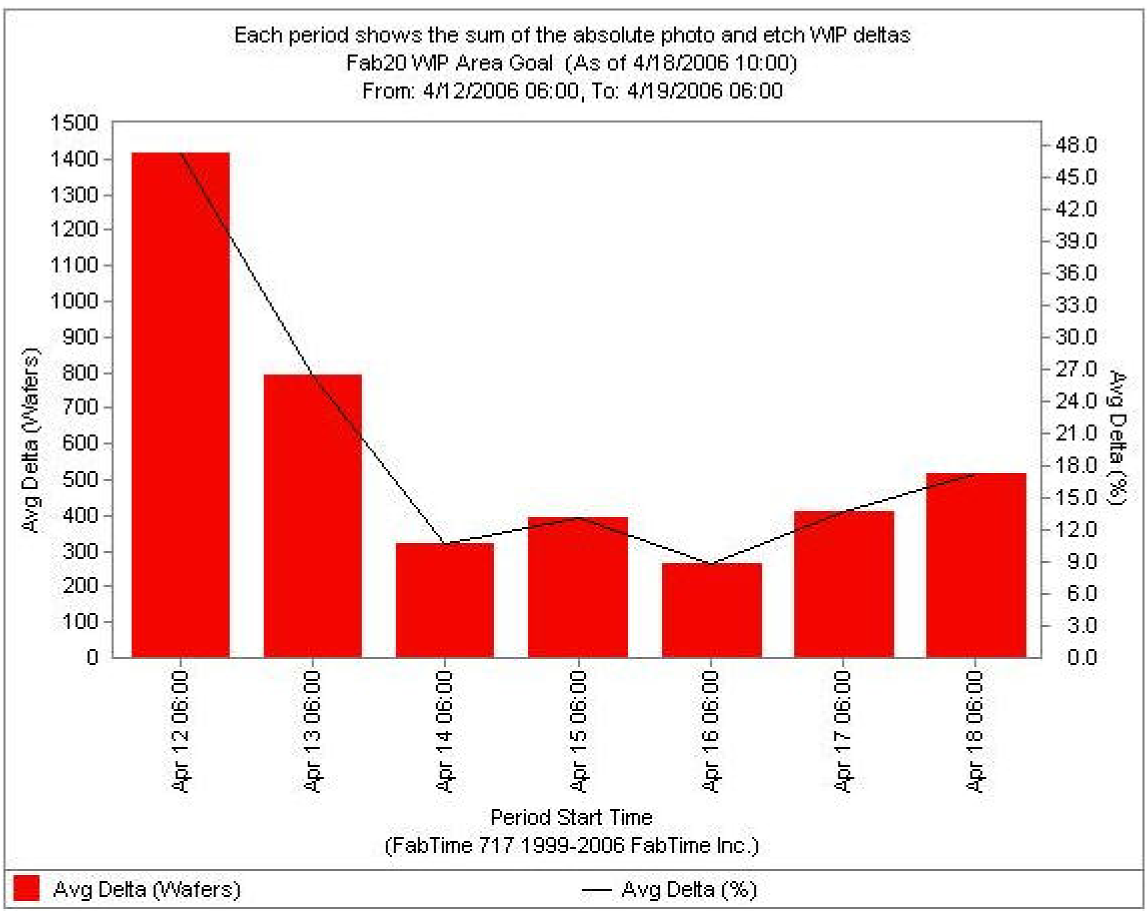
The WIP in a production area is the sum of the WIP in queue/on hold and in process at all of the operations within that production area. WIP goals for individual production areas obviously need to sum up to the total WIP goal. The WIP goals for the individual areas are proportional to the total cycle time that lots spend in each area, again following Little's Law. So, if your lots spend, on average, 1/3 of their total cycle time in Photo, then the average Photo WIP will be approximately 1/3 of the total WIP. The target cycle time for each production area is the sum of the target cycle times for all of the operations in that area. In FabTime, you can also use the Factory Cycle Time Contribution Pareto chart to look, for shipped lots, at the percentage of time that lots spent in the different areas, summed across all operations.

Of course the actual WIP by area will be much more variable from day to day than will the total WIP in the fab. This is one of the primary reasons that WIP turns by area is better metric than moves by area for driving improvements. The closer the WIP in the area can remain to the goal, however, the smoother the fab is running, and the better the cycle time will be, as discussed in more detail in Issue 9.09: WIP Bubbles in Wafer Fabs. This is why we recommend looking at the absolute delta from the WIP goal over time, and trying to reduce that. An example showing a WIP Goal Delta Trend chart is shown below. This chart shows the sum of the average delta from WIP goal across two production areas, trended by day.

Conclusions

In this article, we have discussed setting WIP goals in wafer fabs by using Little's Law, a formula that drives the relationship between cycle time, WIP, and throughout for manufacturing facilities. We have also emphasized the need to ensure that WIP goals are consistent with goals for moves, WIP turns, and cycle time. These metrics are connected as follows: A cycle time goal and a start rate together imply a WIP goal. The start rate and number of steps in a fab also imply a goal for moves. The WIP goal together with the moves goal implies a turns goal, and the turns goal implies a cycle time goal, creating a circular effect. This is shown visually in the PDF version.

In practice, WIP goals by area are more variable, and hence more necessary to track, on a day to day basis. WIP goals by area are proportional to the cycle time that lots spend in each area. We recommend understanding the expected average WIP for each production area, and monitoring the absolute delta from that average over time. This is a key indicator of WIP variability. And, as we have discussed many times in this newsletter, reducing variability is essential to reducing cycle time. We hope that you have found this discussion useful, and we welcome your feedback.



Closing Questions for Subscribers

Do you use WIP goals in your fab? How are they calculated? Do you try to track WIP by area over time, to measure WIP variability?

Further Reading

For another explanation of Little's Law, and some graphs, see FabTime's cycle time tutorial, at www.FabTime.com/ctwip.htm. See also FabTime newsletter Volume 9, Number 9: WIP Bubbles in Wafer Fabs. For other articles that discuss WIP estimation, see the papers below. Most of these papers are not available from FabTime, due to copyright restrictions.

- S. Bilgin and M. Nishimura, "Implementation of a WIP Modeling System at LSI Logic," *2003 IEEE International Symposium on Semiconductor Manufacturing (ISSM '03)*, 293-296, 2003.

- C.-S. Bong and K. V. Karuppiah, "Cycle-Time Reduction Under Product Diversity in Semiconductor Back-End Manufacturing," *Proceedings of the International Conference on Modeling and Analysis of Semiconductor Manufacturing (MASM 2002)*, Editors G. T. Mackulak, J. W. Fowler, and A. Schoemig, Tempe, AZ, April 10-12, 2002. 260-263. This paper describes the application of Little's Law and Kanban system for cycle-time improvement in the high-volume, multiple-product semiconductor manufacturing, with the aim of reducing the WIP (Work-In-Progress) that will slash inventory holding costs. We do have permission from the author to distribute this paper electronically - please email newsletter@FabTime.com for a copy.

- N. Govind and D. Fronckowiak, "Setting Performance Targets in a 300mm Wafer Fabrication Facility," *Proceedings of the 2003 Advanced Semiconductor Manufacturing Conference*, Munich, Germany, 2003. This paper looks at calculating productivity and WIP targets to measure production performance for a 300 mm fab in a ramp mode.

- Wei Jie Lee, "Optimize WIP Scale through Simulation Approach with WIP, Turn-Over Rate and Cycle Time Regression Analysis in Semiconductor Fabrication," *Proceedings of the 2002 Semiconductor Manufacturing Technology Conference*, 299-301, 2002. This paper presents and applies a methodology for determining the optimal WIP scale of an IC manufacturing fab.

- Y. H. Lee and T. Kim, "Manufacturing Cycle Time Reduction Using Balance Control in the Semiconductor Fabrication Line," *Production Planning & Control*, Vol. 13, No. 6, 529-540, 2002. This paper discusses how to determine the proper WIP level for operations, and how to control the balance of WIP flow to achieve maximum throughput under short manufacturing cycle times.

- Y. H. Lin and C. E. Lee, "A WIP Estimation Model for Wafer Fabrication," *International Journal of Industrial Engineering - Theory, Applications and Practice*, Vol. 9, No. 3, 222-237, 2002. This paper explores the significance of standard WIP in wafer fabrication, and presents a method to estimate the standard WIP level in front of each workstation.

- K. Miyashita (National Institute of Advanced Industrial Science and Technology), T. Okazaki (Hitachi East Solutions, Ltd) and H. Matsuo (Kobe University), "Simulation-based Advanced WIP Management and Control in Semiconductor Manufacturing," *Proceedings of the 2004 Winter Simulation Conference*, Washington, DC, Dec. 5-8, 2004. (All WSC papers since 1997 are available for free download from http://www.informs-cs.org/wscpapers.html). The system described in this paper optimizes work-in-process inventory (WIP) levels to meet demands and sets a target WIP level for each workstation.

- Brian D. Neureuther, "Estimating Cycle Time in Complex Job Shops," *Journal Of Integrated Design And Process Science*, Vol. 6, No. 3, 93-104, 2004. This paper looks at the application of Little's Law to semiconductor factories, and discusses factors that may cause the pure application of Little's Law to break down.

Subscriber List

Total number of subscribers: 2840, from 476 companies and universities. 21 consultants.

Top 20 subscribing companies:

- Maxim Integrated Products, Inc. (226)
- Intel Corporation (149)
- Micron Technology, Inc. (83)
- Chartered Semiconductor Mfg. (80)
- X-FAB Inc. (71)
- Western Digital Corporation (68)
- Texas Instruments (64)
- Analog Devices (61)
- Infineon Technologies (61)
- ON Semiconductor (58)
- Freescale Semiconductor (57)
- International Rectifier (55)
- TECH Semiconductor Singapore (55)
- NEC Electronics (53)
- STMicroelectronics (49)
- IBM (45)
- NXP Semiconductors (45)
- Cypress Semiconductor (43)
- Seagate Technology (36)
- ATMEL (34)

Top 3 subscribing universities:

- Virginia Tech (11)
- Arizona State University (8)
- Ben Gurion Univ. of the Negev (8)

New companies and universities this month:

- Selantek, Inc.
- Sensor Dynamics
- SPG Media

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.

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FabTime® Cycle Time Management Software

"Instead of spending time preparing reports, shift facilitators can get the data they need quickly from FabTime, and then spend their time making real improvements."
Mike Hillis
Cycle Time and Line Yield Improvement Manager
AMD Fab 25

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One low monthly price includes

- Software installation and real-time connect to your MES
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- Unlimited users via your Intranet.
- Software maintenance and regular upgrades (approx. 6 per year, via our no-downtime patch system)
- Add-on dispatching and planning module for a slightly higher monthly fee

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Turn fab MES data into information and save time and money

- Are your supervisors swamped with daily reports, but lacking real-time information?
- Is it difficult to link equipment performance to cycle time?
- Does each new cycle time analysis require IT resources?

FabTime can help. FabTime saves your management team time daily by turning fab MES data into information, via a real-time web-based dashboard that includes lot dispatching. FabTime saves your IT staff time by breaking the cycle of custom-developed reports. With FabTime, the end user can filter for exactly what he or she needs, while staying in a comprehensive framework of pre-defined charts. Most importantly, FabTime can help your company to increase revenue by reducing cycle times up to 20%.

"I use FabTime every day, and so do the supervisors who report to me. The data that I need is right on my home page where I need it when I come in every morning."
Jim Wright
Production Manager
Headway Technologies

FabTime Benefits

- Cut cycle times by up to by 20%.
- Focus improvement efforts on the tools that inflate cycle time.
- Improve supervisor productivity – cut reporting time by 50%.