A predictive scheduling solution that improves productivity of key bottleneck areas in the factory

INDUSTRIES
- Semiconductor wafer manufacturing
- Semiconductor assembly and test

FEATURES
- Co-optimize cycle time, throughput and yield
- Incorporation of WIP management BKMs from industry
- Combination and integration of multiple data sources in real time
- Open solution; users can customize objective functions and constraints by themselves
- Out of box area schedulers
- Out of box Integration with Applied SmartFactory Dispatching and FullAuto and planning solutions
- Comprehensive experimentation, what-if analysis capability.
- KPI reporting and dashboards

BENEFITS
- Improves productivity by lowering cycle time and or improving throughput and reducing variability
- Reduces the manual effort for planning /scheduling decisions
- Manage the critical queue time constraints while meeting cycle time / due date requirements
- Reduce capex spending on bottleneck tools
- Reduce the time to respond by rescheduling based on factory events

CHALLENGES
Semiconductor and OSAT manufacturers today are striving to optimize production and implementation. Some of the key challenges these manufacturers face include:
- They need to consistently improve cost and control cycle time to maximize revenue
- Lot of time is spent in planning & managing for factory resources (higher product mix & volume)
- Companies are realizing that ATP productivity is key to improve the on-time demand and ensure the factory productivity gains in the fabs are not negated by low efficiency in the fabs.
- Managing shortages of industrial engineering experts and development resources
- Handling delays in deployment, resulting in long payback times

SOLUTION DESCRIPTION
This short-interval predictive scheduling incorporates factory-wide data from multiple manufacturing plant floor systems, and then runs this data through its prediction and scheduling engines to produce accurate, real-time production schedules. It schedules key bottleneck areas in the such as litho, Wets/Diffusion, Chamber based tool and Implant operations in front end and Die Attach, Wire bonders, Testers in Assembly and test operations—optimizing throughput and improving on time delivery—using sophisticated algorithms that are not possible with dispatching systems alone. It also predicts the movement of all lots in the fab/factory and uses this information as one of the inputs to optimize the scheduling and dispatching decisions in the factory.

APPLIED SMARTFACTORY PRODUCTIVITY SOLUTIONS WITH ENGINEEREDWORKS™
The common framework from data extraction to logic of dispatching is built on the Applied APF platform and EngineeredWorks

Applied SmartFactory® Productivity Solutions – Components
Common Framework from S&OP to Dispatching – Built on Applied APF® platform, Applied EngineeredWorks™ & Optimization

[Diagram and text about components]
SMARTFACTORY SOLUTIONS WITH ENGINEEREWORKS

EngineeredWorks is Applied’s pre-built automation logic that executes on a proven Applied platform. EngineeredWorks increases speed-to-value for customers and provides quicker deployment times. When deploying SmartFactory Scheduling with EngineeredWorks, customers can cut deployment times by more than 50% compared to custom deployments.

<table>
<thead>
<tr>
<th>Scheduling Capabilities for Achieving Enhanced Factory Performance</th>
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<tbody>
<tr>
<td>✓ Scheduling Engine</td>
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<tr>
<td>Out of box area optimization-based schedulers for fab and assembly and test areas, open box solution can be customized to user specific operational scenarios and needs; Embedded MIP/CP and Constraint Programming solvers</td>
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<tr>
<td>✓ Prediction Engine</td>
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<td>Out of box Simulation based prediction engine allows for accurate prediction of lot arrivals. Easily integrate with existing dispatching rules, can be used as an additional input for enhancing dispatching logic in the areas without scheduler.</td>
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<td>✓ Schedule Visualization and Analysis</td>
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<td>Web based user interface which can use on desktop or mobile platforms, Provides ability to change the scheduling parameters based on authorization privileges, Provides ability to do experimentation and analysis on objective function setting, Schedule board allows users to manually adjust the schedules; Provides comprehensive dashboarding and reporting capabilities.</td>
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<tr>
<td>✓ Common Data Model</td>
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<td>Supports common data model for all planning, dispatching, scheduling and simulation solutions. The solutions can be deployed extended and rapidly deployed using this common data model.</td>
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CUSTOMER RESULTS

With Scheduling, customers can defer or eliminate investment in additional lithography equipment by increasing tool utilization.
- Litho utilization was improved by >1%
- Throughput improved 2.1%
- Wire bonders OEE improved > 10%

$2M-20M PER FACTORY

PACKAGE CONTENTS

Built on the mature APF platform, the SmartFactory Scheduling offers proven technology in one package, which includes:

SOFTWARE
- Scheduling EngineeredWorks
- Prediction Engine
- Activity Manager Limited (Solver and ETL blocks)
- Solution UI

The SmartFactory Scheduling solution is pre-integrated with SmartFactory Dispatching and Reporting solution and SmartFactory FullAuto solution

SERVICES, TRAINING AND SUPPORT
- Pre-configured Area schedulers
- On-site deployment provided by an experienced Applied team
- First year Solution Services and technology maintenance
- User training