



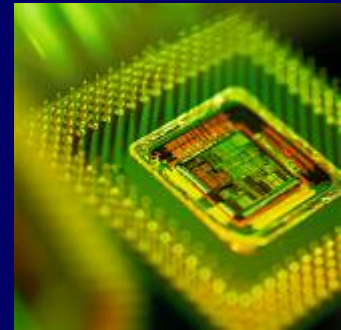
Accelerating Manufacturing Productivity

# 450mm Cost-Sharing Program Overview

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# Background

- This presentation is intended to supplement the Cost-sharing Recommendation document
- Similar questions have been expressed by suppliers that may be clarified here
- If there are any additional questions please contact ISMI
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# Intent

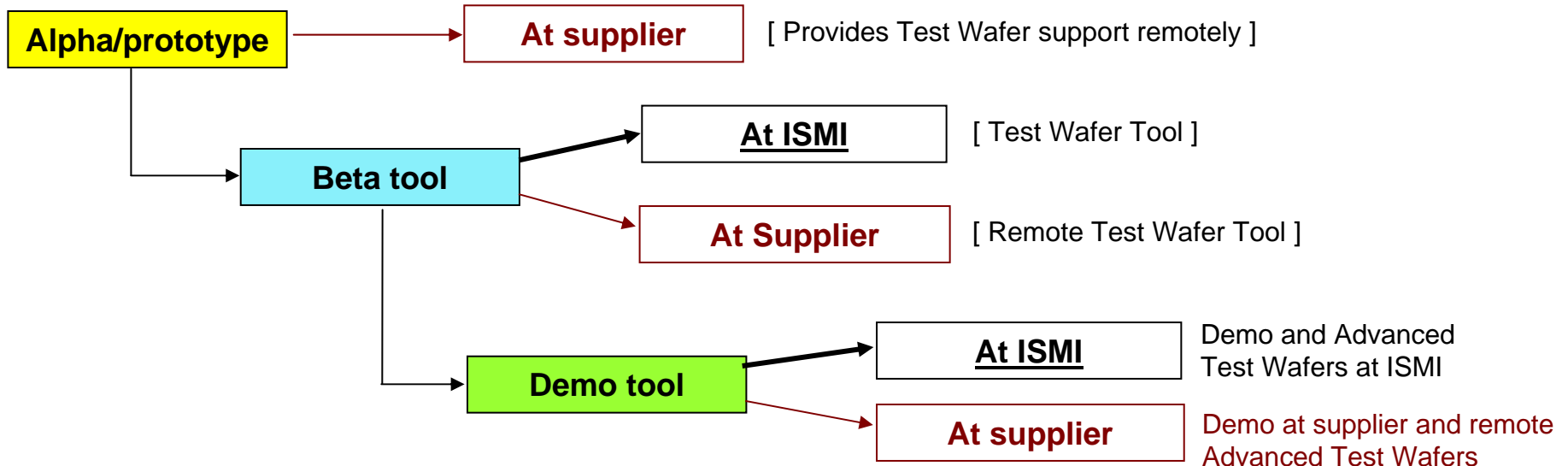
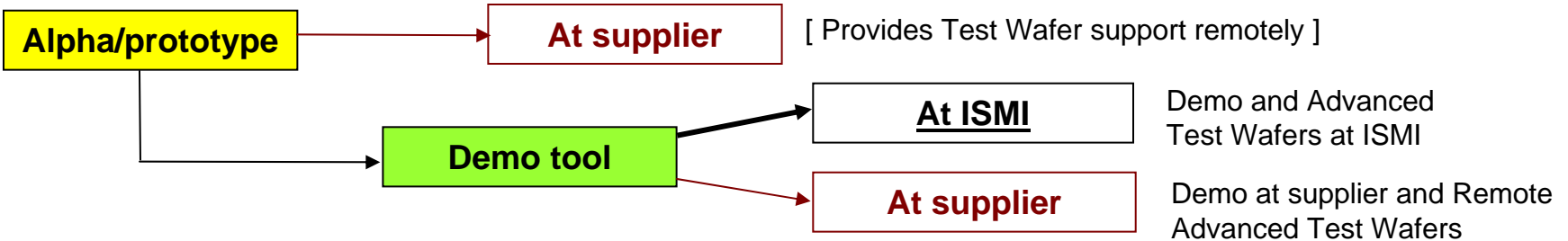


- **ISMI recognizes that the historical financial risk model for wafer-size transition funding is no longer relevant**
  - 300mm – Majority of financial risk on tool suppliers
  - $\leq$  200mm – Majority of financial risk on IC makers
- **Risk-sharing with tool suppliers is expected to realize the 450mm transition**
  - Cost-sharing is the planned mechanism to lower the financial risk
- **ISMI is prepared to engage in discussions and negotiations concerning resources and plan scope**
  - Realistic costs for building tools are needed to help determine which projects will be supported and assess levels of support

# Program Highlights

- **Key areas of ISMI interest:**
  - Technical challenges and targets
    - Including test wafer requirements
  - Commercial challenges
  - Potential schedule
- **Cost-sharing program is structured to allow suppliers maximum flexibility for consideration**
  - Cost-effective transition is the program goal
  - It is expected that suppliers will have different approaches for different business plan objectives
  - There are several decisions to consider in the context of tool development plans and ISMI involvement
  - ISMI requires certain information to evaluate supplier plans

# Example Scenarios



# Terminology



- **Alpha/prototype tool**
  - This is the first generation tool built by the supplier
  - Built at the supplier and could remain there or be located at ISMI
  - Expected to provide Test Wafer processing/measurements for ISMI
- **Beta tool**
  - This is the second generation tool in a 3-tool plan
  - This may located at the supplier or be shipped to ISMI
  - Capable of providing Test Wafer processing/measurement for ISMI
  - Some suppliers may choose not to build a Beta tool
- **Demonstration tool**
  - This would be a mature tool to meet or exceed the EPM expectations and undergo rigorous testing by ISMI
  - This would provide the most sophisticated processing and measurements for ISMI Test Wafers
  - Preferred location is likely at ISMI but a supplier site may be negotiable
- **Test Wafer tool**
  - The maturity and location of tool(s) depends on the supplier plan that is negotiated with ISMI

# Supplier Considerations

- Examples:
  - **How many products or tool-types are considered for participation in ISMI's program?**
  - **Will there be one, two or three generations of 450mm tools in a build plan?**
    - Alpha/prototype only (e.g. custom Test Wafer tool at ISMI)
    - Alpha/prototype and Demonstration only
    - Alpha/prototype, Beta and Demonstration tools
  - **Will an Alpha/prototype tool stay at the supplier location or be located at ISMI?**
    - Alpha/prototype may be at ISMI as a Test Wafer tool
    - Alpha/prototype tool may stay at the supplier for testing/iteration but also processes/measures Test Wafers shipped by ISMI

# Supplier Considerations

- Examples continued:
  - **Would a Beta tool be located at ISMI as a Test Wafer tool?**
    - Or would a Beta tool remain at the supplier's location for testing/iteration and provide remote support of ISMI Test Wafers that are shipped to a supplier?
  - **If a Demonstration tool is planned, when would it be available for Test Wafer processing/measurement and when would it be ready for a demonstration?**
    - Would the demonstration occur at ISMI or at the supplier?
  - **What would be the cost to build each tool in your 450mm plan(s)?**
    - What would be the necessary timing based on your 450mm tool plans?

# ISMI Expectation of Supplier Plans

- The following items are necessary for evaluation by ISMI:
  - Which product or tool types are planned for participation with ISMI?
    - Please provide separate plans for each product or tool type
  - Will there be one, two or three generations of a 450mm tool type in a supplier's build plan?
    - 1 tool: Alpha tool only (e.g. custom Test Wafer tool at ISMI)
    - 2 tools: Alpha and Demonstration tool
    - 3 tools: Alpha, Beta, and Demonstration tools
  - Where should each generation of tool be located?
  - What would each tool generation be capable of doing?

# ISMI Expectation of Supplier Plans

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- What quantity and type of test wafers would be needed from ISMI to assist in each tool build?
- What quantity and type of test wafers could be processed/measured for ISMI?
- What is your estimated build schedule for each tool?
- What will each tool build cost, given the schedule you have provided?
- What are the technical challenges expected for each tool?
- What are the commercial challenges expected for each tool over time?

# ISMI Evaluation of Supplier Plans

- **Plans would be evaluated for:**
  - Scope of intended participation
    - Alpha/prototypes, Beta tools, Demonstration tools
    - Which tools will provide Test Wafer support
    - Desired location of each tool
  - Types and quantities of Test Wafers that could be processed/measured for ISMI
  - Timeframe in which tools and capabilities could become available
  - Overall build cost for tools over time
- **Negotiation of agreements should be expected**

# Summary

- ISMI's 450mm Program goal remains a cost-effective transition
- Cost-sharing negotiations will consider both the challenges and the benefits for suppliers and ISMI
- ISMI is interested in plans that maximize the performance of each supplier

**Thank You**

**We look forward to  
discussion of your 450mm  
Cost-Sharing Plans**

# Backup

# ISMI 450mm Test Wafer Generation Strategy

## Motivation

- Few suppliers can generate all of their own test wafer needs.
- Supplier feedback from the 300mm conversion was that I300I's coordination of test wafers was very useful.
  - Significantly reduced cost and sped development

## ISMI Approach

- Coordinate 450mm wafer processing to facilitate supplier equipment development
- Loan 450mm test wafers for process and metrology equipment development to suppliers

# Test Wafer Generation Stages

## Early Test Wafers to assist development of prototype tools

- Key to basic Test Wafers for supplier development
- Tools and processes not expected to be of demonstration maturity
- Virtual processing at suppliers site OK for most processes



## Test Wafers to enable supplier development of Demonstration tools

- Sophisticated development-grade Test Wafers are required
- Advanced litho & patterning required for Demo Tool development
- Sufficient quantities of wafers needed for adequate testing and refinement
- Virtual processing at supplier site OK for some processes but not others



## Test Wafers to execute Demonstrations at 32nm technology or beyond

- Very sophisticated test wafers to refine their processes to 32nm or beyond
- Sufficient quantity of wafers is required to execute process testing and reliability marathons with process stability testing

# Early 450mm Test Wafer Generation

## - Top Priority Capabilities and Expectations



**Particle Detection Metrology**

**Film Thickness Metrology**

**Thermal oxide deposition**

**Wet Cleans**

**PECVD Oxide**

**PVD Metal**

**Silicon Nitride**

**Early Patterning Capability**

**Dielectric Dry Etch**

**Dry Strip Asher / Wet Clean**

**CD Measurement**


**Dielectric CMP for reclaim**

### Targets for Early Test Wafer Tools

- Desired process performance is the current 300mm capability or better
  - Lower performance may be acceptable to satisfy timing and capability needs
- Defect densities are a lesser concern for early TW tools
- Throughput and reliability are important, but only to support the level of TW processing volume
- Automated wafer handling
- Safe to Operate and Maintain

 = Capabilities selected by ISMI to date

 = Deposition capabilities pursued

 = Patterning/reclaim capabilities being pursued