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TO: Dear Emmanuel
FROM: Mike McClintock

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COMMENTS:

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Name of company / institution: IBM
Location of company: Essex JCT VT
Name of participant: Mike McClintock
Position in company: Maintenance Project Mgr
A. General PM Scheduling Guidelines

1. There is no previous PM scheduling Best Practices Survey readily available:
   - [ ] Strongly agree   - [ ] Agree   - [ ] Disagree   - [x] Don't know
   Comments: 

2. There is a clear need for PM scheduling based on mathematical optimization models and/or simulation:
   - [ ] Strongly agree   - [ ] Agree   - [ ] Disagree   - [ ] Don't know

3. PM scheduling is currently integrated with fab simulation models:
   - [ ] Strongly agree   - [ ] Agree   - [x] Disagree   - [ ] Don't know
   Comments: 

4. Some PM scheduling is based on calendar dates (i.e., number of days since last PM):
   - [x] Yes   - [ ] No

5. Some PM scheduling is based on the count (i.e., number) of wafers processed since the last PM:
   - [ ] Yes   - [x] No

6. Some PM scheduling is based on length of time tool has been operating since the last PM:
   - [x] Yes   - [ ] No

7. Which of the three (questions 4, 5 or 6) is most prevalent in your fab(s):
   - [x] (4) above   - [ ] (5) above   - [ ] (6) above
   Comments: 

8. Quantifying wafer-based count is difficult, e.g., different wafers may require different lengths of tool operation time:

☐ Strongly agree  ☐ Agree  ☐ Disagree  ☐ Don't know

Please comment on how this is being addressed in your fab(s):


9. PM scheduling focuses on key bottleneck tools, e.g., litho tools or CVD cluster tools:

☐ Strongly agree  ☐ Agree  ☐ Disagree  ☐ Don't know

Please list the tools that are most critical in your fab(s):


10. Consolidation of maintenance tasks is critical: perform related PMs at the same time, or perform scheduled PMs when unscheduled maintenance is required:

☐ Strongly agree  ☐ Agree  ☐ Disagree  ☐ Don't know

Comments:


11. PM scheduling utilizes Statistical Process Control (SPC) information:

☐ Strongly agree  ☐ Agree  ☐ Disagree  ☐ Don't know

12. PM scheduling managed "locally," i.e., each tool group has total control of its PM scheduling:

☐ Strongly agree  ☐ Agree  ☐ Disagree  ☐ Don't know

13. There is coordination between tool groups on PM scheduling:

☐ Strongly agree  ☐ Agree  ☐ Disagree  ☐ Don't know

Comments:
14. Simple rules-of-thumb are employed for PM scheduling in your fab(s):

- [ ] Strongly agree  - [x] Agree  - [ ] Disagree  - [ ] Don't know

15. Basic spreadsheet analysis is employed for PM scheduling in your fab(s):

- [ ] Strongly agree  - [ ] Agree  - [x] Disagree  - [ ] Don't know

16. Mathematical optimization and/or simulation are employed for PM scheduling in your fab(s):

- [ ] Strongly agree  - [ ] Agree  - [x] Disagree  - [ ] Don't know

17. What type of heuristics (rules-of-thumb), simulation or model-based/optimization methods are employed for PM scheduling in your fab(s)?

Comments:

18. The time “unit” used in scheduling PMs is workers’ shifts, e.g., two or three per day:

- [ ] Strongly agree  - [ ] Agree  - [x] Disagree  - [ ] Don’t know

Comments:

19. PM time/wafer count windows are used to allow flexibility in scheduling, e.g., due date can be within +/- 10% of target calendar/wafer count:

- [x] Yes  - [ ] No

20. What type of PM time or wafer count windows are used in your fab(s)? Please specify tool type(s):

Comments: Usually 1-2wk window most tool types
B. WIP Factors Affecting PM Scheduling

21. WIP estimation is very difficult beyond a planning period of a few days (please quantify approximately how many days WIP estimates are valid for):
   □ Strongly agree    □ Agree    □ Disagree    □ Don't know
   Comments: 3

22. How long are the PM scheduling planning periods in your fab(s)?:
   □ Weekly    □ Bi-weekly    □ Monthly    □ Other (specify)

23. "Rolling horizon" schedules are frequently used, where on each day, or shift, schedules are re-calculated for the entire planning horizon to incorporate newly available information:
   □ Strongly agree    □ Agree    □ Disagree    □ Don't know

24. Due date estimates for PMs based on wafer counts are often very unreliable, e.g., due to poor WIP estimates:
   □ Strongly agree    □ Agree    □ Disagree    □ Don't know

25. It is critical to try to schedule PMs during low WIP periods:
   □ Strongly agree    □ Agree    □ Disagree    □ Don't know
C. Data Factors Affecting PM Scheduling

26. There are "Torrents of Data" flowing through the fab databases, mostly unused for modeling and decision making:

- [ ] Strongly agree
- [ ] Agree
- [X] Disagree
- [ ] Don't know

27. Historical data on PM scheduling (planned and actual) not always saved:

- [ ] Strongly agree
- [ ] Agree
- [X] Disagree
- [ ] Don't know

How is this handled in your fab(s)?:

28. Reliability of data can be a problem, e.g., duration and variability of time to complete a given PM task:

- [ ] Strongly agree
- [ ] Agree
- [ ] Disagree
- [ ] Don't know

Comments:
D. Software Tools employed

29. What commercial Manufacturing Execution Systems (MES) are used in different aspects of PM scheduling in your fab(s):

☐ WorkStream  ☐ Proteus  ☐ Other (specify)

Comments:

30. Are there any other in-house developed software tools used in different aspects of PM scheduling in your fab(s)? Please comment on what these are used for, and why commercially available, if any, software tools are not used instead:

Comments:

31. What computer platforms are available in your fab(s) for model implementation and computations associated with PM scheduling?:

☐ MS Windows  ☐ Linux  ☐ Unix  ☐ Macintosh  ☐ Other (specify)

Comments:

32. What simulation software is used to model your fab(s)?:

☐ AutoSched AP  ☐ Factory Explorer  ☐ Other (specify)

Comments:
E. Other Issues Affecting PM Scheduling

33. Availability/inventory of supplies and kits needed for PM tasks can be a problem:

☐ Yes  ☐ No

34. Please comment if the issue of availability/inventory of supplies and kits is directly addressed in your fab(s), e.g., by having a person responsible for inventories:

Comments:

ALL PARTS SET UP THRU "CRIS"
SYSTEM

35. Manpower resources, e.g., headcount of maintenance technicians, is an important constraint in PM scheduling:

☐ Strongly agree  ☐ Agree  ☐ Disagree  ☐ Don't know

Comments

36. Workforce coordination is needed (PM tasks can extend over several shifts):

☐ Strongly agree  ☐ Agree  ☐ Disagree  ☐ Don't know

Comments:
37. Certain times are avoided for PMs, e.g., weekends when qualified personnel are not available, or when supplier-company technicians must be paid overtime:

☐ Strongly agree  ☐ Agree  ☑ Disagree  ☐ Don't know

Comments:

38. PM due dates can be very conservative estimates; thus, tool kits are not used for their full life, e.g., in wafer-based PM tasks with wafer lots that demand different amounts of work per wafer:

☐ Strongly agree  ☑ Agree  ☐ Disagree  ☐ Don't know

39. There is a minimum number of tools in each tool group that should be up (i.e., not undergoing maintenance/repair) at all times:

☑ Yes  ☐ No

40. After the warranty period, do PM frequencies follow manufacturer's recommendations or are they decided by company personnel? Please comment:

Comments: By company personnel taking into account manufacturer's recommendations as well as our experiences.

41. Are there any other comments you want to make?

Comments: