MEGA FLUID SYSTEMS

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Slurry System Application Questionnaire

Slurry Material Questions

1. What brand and model of slurry must be dispensed and/or blended in the system? Can you supply an MSDS for this slurry?
2. What is the density and viscosity of the unblended stock slurry?
3. What are the process temperature constraints of this slurry?
4. What is the minimum velocity requirement of the slurry to remain in suspension? Is this slurry shear sensitive?

Raw Slurry Handling Questions

1. In what type of vessels (brand, size) will the unblended stock slurry be provided?
2. How far (linear distance run) from the slurry blend and dispense system will this unblended stock slurry vessel(s) be located?
3. What is the elevation difference between the unblended stock slurry vessel(s) and the slurry blend and dispense system?
4. How many vessels must the unblended stock slurry supply system draw from? Is automatic switching between these vessels required?
5. Is there a requirement for mechanical mixing using a motor or impeller at the vessel(s), or is pumped circulation sufficient for mixing the vessel(s)? If the former is required, can the motor be pneumatically driven, or does it need to be driven by an electric motor?
6. Are keyed quick disconnects required?
7. Is there a requirement for a standby vessel to be simultaneously circulated while the contents of another vessel are being supplied to the slurry blend and dispense system? Is there a specific duration of mixing and/or periodicity of mixing events that needs to be observed?
8. Do the vessel(s) require a holding cabinet? A drip pan?
9. Do cabinets and drip pans for the unblended stock slurry systems need to consist of FM4910 materials? If so, what is the percentage by mass or volume (please identify basis) of FM4910 cabinet material required?
10. Are rollers required? Drum stability chains?
11. Is exhaust monitoring and exhausts required for the unblended stock slurry system and stock vessel storage cabinet (if any)?
12. Are there special unblended slurry supply pressure or flow metering requirements or constraints? If so, at what points in the process will this data be extracted?

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13. What means of monitoring levels in the unblended stock slurry vessels is required? Is a vessel empty capacitive signal on the vessel supply line sufficient or does there need to be finer granularity in level monitoring? If the latter, are scales or ultrasonic measurement means more acceptable?
14. Does the unblended stock slurry supply system require an independent PLC or an independent HMI? If the latter, does the HMI require color or touch screen capability?
15. Are there any special process devices or features required like slurry homogenizers or unblended stock slurry Day Tanks? If so, what is the customer's intent for how these should be applied?
16. Will the unblended stock slurry supply system be placed on a mezzanine above the vessels?

Slurry Blend & Dispense Questions

Process Strategy and Configuration Questions

1. Is there a requirement for dedicated blend or distribution system(s)? Note that dedicated blend or distribution systems result in series station arrangements. The distribution systems designed in this format achieve a continuous supply to the fab without the need of complicated distribution control transfer sequencing. A drawback is that the distributing station tank can not be flushed or purged without disabling the global loop.
2. Can blend and dispense system functions be shared within a process unit (we call these stations)? Note that shared systems result in parallel station arrangements. These stations alternate blend and dispense functions to achieve a continuous supply of slurry to the fab.
3. What is the maximum number of blend stations allowable?

Global Loop Service Questions

1. What is the desired make-up rate for the system? What are the number of POUs? How many POUs must be supplied? What is the percent utilization of these POUs?
2. What is the minimum POU pressure? Any maximums?
3. What is the maximum allowable pressure fluctuation in the global loop?
4. What is the global loop length (measured along the entire loop, not just the maximum distance between the most distal loop point and the slurry blend/dispense engine)?
5. What is the elevation difference between the slurry blend/dispense system and the global loop?
6. What is the elevation difference between the global loop and the CMP units? What is the actual length of this line? What is its diameter?
7. Will the POU feeds to the CMP tools have a direct supply or Tichelmann configuration? If the latter, is the isolated supply loop to be controlled by manual or automated means?

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8. Are POU filters placed on the POU supply lines to the CMP units? What size, make, and model of filter media and/or housing are these? What is the maximum pressure differential before the filters are changed out?
9. What is the required global loop diameter? Can this be increased or decreased to achieve pressure, flow, or velocity objectives?
10. How many global loops must be supplied? Is there a requirement for automated global loop switching? Do both global loops need to be simultaneously active for a short period? If so, what is that period?
11. Is there a global loop flush/purge requirement? If so, does this flush/purge function require complete isolation from the distribution subsystem, or can the flush/purge function be performed using the distribution subsystem as the driving engine for the fluid? Is there a chemical flush requirement for the global loop? Can this be achieved by adding chemical to the distribution station, or does there need to be a separate port for the chemical on the global loop?

Blend System Questions

1. If the required system will blend the slurry, can you please provide the slurry, hydrogen peroxide (or other chemical), and/or DI water ratio in terms of volume or mass? Does the slurry require another additive? If so, please identify and quantify the volumetric or mass proportion of this constituent.
2. What is the maximum error, in terms of weight percent, of the hydrogen peroxide (or other chemical) in the slurry?
3. What method of slurry mixing is required?
    A. Mechanical with an impeller, shaft, and mixer motor? If chosen, does the motor require electrical or pneumatic service?
    B. Simple pumped circulation?
    C. Pumped circulation through eduction-injection nozzles?
4. What qualification measurement techniques must be applied
    A. Density measurement?
    B. pH measurement?
    C. Conductivity?
    D. Chemical concentration measurement?

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5. If chemical concentration measurement for blend qualification is required, which of the following techniques are preferable:
   A. Automated titration?
   B. Refractometry?
   C. Ultrasonic?
   D. NIR?
6. If multiple blend systems are utilized, is there a requirement for the metrology to be shared between units, or does each independent system require independent metrology equipment?
7. Is there a requirement for replenishment of hydrogen peroxide in the blend tank to maintain concentration? Please consult factory as replenishment may not be supported with certain concentration measurement techniques.
8. Are flow and/or pressure metering of the blended slurry in the local circulation circuit required? If so, can the devices provide visual indication only or do they need to provide an analog signal to the PLC? Is there a redundancy or bypass requirement?
9. What is the preferred make or brand of pump for the blend system? Can we choose this?
10. Does the customer require pump redundancy? If so, are both parallel and series (centrifugal pumps only) arrangements acceptable?
11. What tank size is required? What is the maximum and minimum batch size?
12. Are polypropylene tank materials acceptable? If not, please identify the required material(s).
13. Our blend systems offer considerable flexibility for the metering of blend constituent quantity. Which of the following slurry and DI water addition techniques are acceptable for your application (please note that your choice affects the resulting blend error):
    A. Scale metering?
    B. Capacitive level metering?
    C. Flow meter addition?
    D. Flow control addition?

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14. Which of the following hydrogen peroxide or other chemical addition techniques are acceptable for your application (please note that your choice affects the resulting blend error):
    A. Scale metering?
    B. Capacitive level metering?
    C. Flow meter addition?
    D. Flow control addition?
    E. Captive volume metering?

Distribution System Questions

1. What is the preferred make or brand of pump for the blend system? Can we choose this?
2. Does the customer require pump redundancy? If so, are both parallel and series (centrifugal pumps only) arrangements acceptable?
3. What tank size is required? What is the maximum and minimum liquid volume range that will be contained within the tank?
4. Is single point, four point, two point, or continuous tank level sensing required?
5. Which type of back pressure control is acceptable:
    A. Pneumatic passive?
    B. Pneumatic active?
    C. Manual?
6. Are global loop supply pressure and/or flow monitoring required? If so, can these be visual detection only, or must the devices send an analog signal to the PLC? Please note that if a parallel (shared) system arrangement has been chosen, then the global loop supply pressure device must provide an analog signal to the PLC.
7. Are global loop return pressure and/or flow monitoring required? If so, can these be visual detection only, or must the devices send an analog signal to the PLC? Please note that if pneumatic active back pressure regulation has been chosen, then the global loop return pressure device must provide an analog signal to the PLC.
8. What slurry quality monitoring techniques must be applied to the distributing system:
    A. Density measurement?
    B. pH measurement?
    C. Conductivity?
    D. Chemical concentration measurement?

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9. If multiple shared systems are utilized, is there a requirement for the metrology to be shared between units, or does each independent system require independent metrology equipment?
10. Is there a requirement for replenishment of hydrogen peroxide in the distribution tank to maintain concentration? Please consult factory as replenishment may not be supported with certain concentration measurement techniques.
11. What PLC platform is required? Can we choose?
12. Does the system HMI need to have touch screen and color capability?
13. Is there a SCADA requirement for the system? If so, please define the protocol (SECS GEMS, etc.) and method of delivery (Ethernet, DH+, etc.).

Slurry Filtration Questions

1. Will filtration be required on the unblended supply, blend circuit, and/or distribution – global loop circuits?
2. If filtration is needed, what filter length and media porosity should they have?
3. How many filter banks will be required? How many filters per bank?
4. Do the filters require automatic degassing functions?
5. Do the filters require manual flush/purge, automatic flush/purge, or capped port functions?
6. Is a bowl-up configuration for the filters acceptable? We recommend this for slurries because it allows for more complete air removal for air-sensitive distribution lines.
7. Is an automated filter bank switching function required? Will the trigger be pressure differential or time based?
8. Should the filter bank assemblies be supplied with a filter-less bypass?
9. Is PP an acceptable material for the filter housings?

Additional Comments