|  |  |  |
| --- | --- | --- |
| **Company:** |  | **Date:** |
| **Location:** |  | **Email Address:** |
| **Contact Name/Title:** |  | **Phone (office):** |
| **Department:** |  | **Phone (mobile):** |
| **Type (Check Applicable):** | **PV/Solar** |  | **Semiconductor** |  | **Other** |
| **Fully Integrated** |  | **Wafer Only** |  |

###

| **Question:** | **Eng Req’d** | **Current** | **1 – 5 Yr. Proj.** | **Additional Comments** |
| --- | --- | --- | --- | --- |
| **Wafer Info** | Wafer Size (125mm, 156mm, 200mm, 300mm, etc) |  |  |  |  |
| Wafer Thickness (µm) |  |  |  |  |
| Production Out (Wafers per Month) | ✓ |  |  |  |
| Wire Thickness (µm) |  |  |  |  |
| **Saw Info** | Number of Wire Saws |  |  |  |  |
| Manufacturer/Models/ |  |  |  |  |
| Length of Ingots cut, mm |  |  |  |  |
| Ingot cut time, hours |  |  |  |  |
| # of Ingots Cut Simultaneously |  |  |  |  |
| **Grit** | Type of grit used and color (F600, JIS1200, etc.)? | ✓ |  |  |  |
| Current Supplier(s)? |  |  |  |  |
| Cost per kilogram?  |  |  |  |  |
| Monthly volume used? | ✓ |  |  |  |
| Do you purchase your own virgin grit? |  |  |  |  |
| **Carrier** | Type of used (Oil, PEG, DEG, etc.)? | ✓ |  |  |  |
| Density of Carrier (kg/l)? | ✓ |  |  |  |
| Current Supplier(s)? |  |  |  |  |
| Cost per kilogram?  |  |  |  |  |
| Monthly volume used? | ✓ |  |  |  |
| Do you purchase your own virgin carrier? |  |  |  |  |
| **Specs** | Target slurry density (specific gravity) required? | ✓ |  |  |  |
| Other slurry specifications, such as viscosity, particle size distribution, iron levels, silicon levels, water levels, or other parameters? | ✓ |  |  |  |
| **Specs (Con’t)** | Water levels in used slurry? Density of used Slurry? | ✓ |  |  |  |
| **Used Carrier** | If proposal is for carrier recovery only, what is the density, water content and solids content of used carrier? What are the targets for these in the recovered carrier? | ✓ |  |  |  |
| **Slurry Usage** | Total volume delivered to saws per month? | ✓ |  |  |  |
| Volume of slurry replaced (regenerated) after each cut? |  |  |  |  |
| Volume of slurry tanks in saws? |  |  |  |  |
| Do you have a slurry distribution loop? Is it an efficient process? |  |  |  |  |
| **Wire Saw and Wafer Cleaning** | Wire saw cleaning frequency? |  |  |  |  |
| Wire saw cleaning method (carrier, solvent, water, other)? |  |  |  |  |
| Wafer cleaning method (carrier, solvent, water, other)? |  |  |  |  |
| Monthly volume of cleaner used and cost per kilogram? |  |  |  |  |
| Do you purchase your own materials? |  |  |  |  |
| Current cleaning material supplier(s)? |  |  |  |  |
| Is spent cleaning solution recycled or disposed? | ✓ |  |  |  |
| If disposed, how (bulk; drums)? | ✓ |  |  |  |
| Would water/solvent reclamation system be of interest? | ✓ |  |  |  |
| Other cleaning costs (disposal of fluids, labor, etc.)? |  |  |  |  |
| **Recycle?** | Do you recover/recycle grit? |  |  |  |  |
| Do you recover/recycle carrier fluid? |  |  |  |  |
| What percentage of your total slurry usage is recycled (ie, is all of the volume recycled)? |  |  |  |  |
| **Recycle?** | If you do not recycle, how do you dispose of exhausted slurry (drums; bulk; hauler company?) |  |  |  |  |
| What are your costs of disposal and labor costs associated with disposed slurry?  |  |  |  |  |
| What percentage virgin grit is added back to recycled slurry prior to use? |  |  |  |  |
| If grit “add back” is greater than 20% is there comfort with 15-20% add back (80-85% recovery)? |  |  |  |  |
| What percentage virgin carrier fluid is added back to recycled slurry prior to use? |  |  |  |  |
| If carrier “add back” is greater than 20% is there comfort with 15-20% add back (80-85% recovery)? |  |  |  |  |
| Are you satisfied with your current reprocessing program in terms of quality, consistency, costs and reliability of supply (if off-site program)/ease of operation (if onsite equipment)? |  |  |  |  |
| **On-site/Off-Site Questions** | What percentage virgin carrier fluid is added back to recycled slurry prior to use? |  |  |  |  |
| If material is recycled/reprocessed offsite, by whom? Average cost per kilogram? |  |  |  |  |
| If material is recycled/reprocessed onsite, who provided equipment and what type of process is used? |  |  |  |  |
| If material is recycled/reprocessed onsite, is equipment centralized or located next to wire saw? Equipment age? |  |  |  |  |
| Is there equipment CRS can work with you to see if it could be used with our system?  |  |  |  |  |
| How much labor is involved in operating equipment and what are average monthly costs? |  |  |  |  |
| Who maintains recycling equipment and what is average annual maintenance cost? |  |  |  |  |
| **HSE** | Are there any environmental issues associated with slurry disposal? |  |  |  |  |
| Are there corporate objectives in place to minimize waste? |  |  |  |  |
| **Utilities** | Electrical power? What type (400V 3-phase, 200V, etc) is available? |  |  |  |  |
| Cooling water available? |  |  |  |  |
| Steam available? |  |  |  |  |
| Compressed dry air? How dry is it? |  |  |  |  |
| Do you have a wastewater treatment process or do you rely on local government treatment processes? |  |  |  |  |
| **Space Requirements** | Space permitting, CRS usually designs system around a 3 day supply of finished slurry inventory. Would this be sufficient for your operating needs? Note: larger inventory increases the area required by CRS to operate. |  |  |  |  |
| What space is available on-site for reprocessing equipment (a typical 650 MT system with two centrifuges, filtration equipment, tanks, office and storage space requires approximately 30 m x 10 m x 10 m)? |  |  |  |  |
| Is there a 2 MT overhead crane available? |  |  |  |  |
| Can a drawing of the facility be provided (AutoCAD would be preferred)? |  |  |  |  |
|  |  |  |  |  |
| **CRS Solution** | Would a more tightly sized particle distribution improve your slicing process?  |  |  |  |  |
| Would you be interested in reducing your slurry usage per wafer? |  |  |  |  |
| Would you be interested in an on-site slurry recovery system that provides higher quality and recovery of slurry; consistent batch specifications; cost savings; and environmental benefits? |  |  |  |  |
| Would you be interested in an on-site solvent recovery depending on type of wire saw cleaning solution? |  |  |  |  |
| Amount of influence existing wire saw supplier has on slurry recovery (none, must user their system, recommendation)? |  |  |  |  |
| General feelings of interest in CRS process? |  |  |  |  |
| Years in operation |  |  |  |  |
| Number of customers, concentration %?List of customers |  |  |  |  |
| **Samples** | A 1-liter sample of used slurry (or used carrier) for analysis.If the carrier is something other than PEG200 or DEG, a larger sample may be required for filtration evaluation. |  |  |  |  |
| **Financial/Approvals** | Have government incentives been received? |  |  |  |  |
| Can financials be viewed to better determine capitalization and stability |  |  |  |  |
| Are there capital spending limitations in place? |  |  |  |  |
| What people are required to make final approval of an on-site service? |  |  |  |  |
| Timeline for Process? |  |  |  |  |
|  |  |  |  |  |

Other Comments: