ELECTRO-STATIC CHUCKS

REPAIR & RE-FURBISHING

BY

Q-FLEX INC

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ESC REPAIR & RE-FURBISHMENT

Q-FLEX WAS ESTABLISHED IN THE YEAR 1998 FOR MANUFACTUIIRNG FLEXIBLE AND RIGID CIRCUIT BOARDS AND ALSO RE-FURBISHING AND REPAIRING OF POLYAMIDE BASED ELECTRO STATIC CHUCKS FOR THE SILICON WAFER PROCESSING INDUSTRY.

Q-FLEX'S MANAGEMENT TEAM CONSIIST OF ENGINEERS WHO HAVE EXTENSIVE KNOLWDGE AND EXPERIENCE WORKING WITH ELECTRO STATIC CHUCKS.

Q-FLEX HAS MORE THAN 15 YEARS EXPERIENCE IN THE REPAIR AND RE-FURBUSHING OF POLYAMIDE BASE ELECTRO STATIC CHUCKS OF AMAT, TEL, CREATIVE, ETC…

Q-FLEX WITH ASSOCIATE TECHNICAL PARTNERS IN THE FIELD HAVE MORE THAN 8 YEARS OF EXPERIENCE IN THE REPAIR AND RE-CONDITIONING OF CERAMIC BASE ELECTRO STATIC CHUCKS

ESC REPAIR & RE-FURBISHMENT

EXPERIENCED WITH :

AMAT TYPE DPS, MxP, MxP+ POLYAMIDE ESC
Q-FLEX, CAN OFFER RE-FURBISHING MOST OF THE PART NUMBERS TO OEM SPECIFICATIONS.

- TEL, LAM AND CREATIVE ESC'S
- CERAMIC BASED AMAT ESC AND HEATER
- CERAMIC BASED VARIAN ESC'S
- DESIGN AND RE-ENGINEERING OF POLYAMIDE ESC'S

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ESC REPAIR & RE-FURBISHMENT

- Q-FLEX : ESC REFURBISHING PROCESS

ESC Repair and Refurbishing Process Flow Chart :

Receipt of non functional ESC to Q-Flex for Repair/Refurbishment → In coming Inspection at Q-Flex → Incoming Report feedback to customers if Requested. → Flex removal → Clean pedestal → Perform anodizing integrity test → Re-Anodize if necessary → Manufacture flex using Identical Materials and Processes as OEM → Laminate flex to pedestal using same Process - Parameters as OEM → Perform Electrical Test / Final Inspections → ship to customer with C. of C.

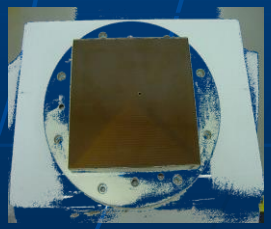
All the Incoming Polyamide based ESC's follow the above process flow chart.

ESC REPAIR & RE-FURBISHMENT

RE-FURBISHED PARTS ARE PROCESSED FOR CUSTOMERS IN USA AND OVERSEAS MARKETS OF ASIA AND EUROPE :

MAJOR FABS COMPANIES WE REGULARLY DO REWORK FOR IN LOCAL MARKET

- INTERNATIONAL RECTIFIERS
- POLAR SEMI CONDUCTORS
- ON-SEMI CONDUTORS
- ADVANCE ION BEAN TECHNOLOGY
- ADVENT TECHNOLOGY
- FAIRCHILD SEMICONDUCTORS
- MAXIM INTEGRATED
- UC BERCKELEY
- ATMEL SEMICONDUCTORS
- CYPRESS SEMICONDUCTOR



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- **Frequently Asked Questions (FAQ) on ESC Chucks**

- **What exactly is the Refurb. Pedestal ? What is a refurb. process ?**

- When a new pedestal is installed in the chamber, it is exposed to the process that degrades the flex layer over the chuck surface. After a certain number of hours, the pedestal fails to function and a new pedestal is needed. The new units are expensive but a refurb. unit offers a valid choice.
- During refurb. process, the old flex layer is removed by a proprietary process and the anodization is checked over the entire surface. If there is any imperfection, the anodization is stripped and new layer is placed according to the OEM spec. Flex circuit is made with materials specified by OEM and manufactured step by step in accordance to the OEM guidelines. The flex circuit copper area and configuration is exactly same as the flex on the new pedestal. The flex is laminated by following process parameters same as those used by OEM. After the pedestal is ready, it is tested for electrical functionality as well as visual characteristics .

- **What is the difference between a new and a refurb pedestal ?**

- For all practical purpose – none. The manufacturing process is same,
- the materials are same.

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- **What is the history on the refurb units ?**
- The refurb units have been used by many fabs since 1997. There has been no reports of any troubles.
- **What is the purpose of using refurb ESC ?**
- There is a substantial cost reduction by using refurb ESC while maintaining equal or better performance.
- **How is the cycle time in the chamber ?**
- The refurb pedestal will last equal number of hours or more on average compared to a new chuck. Our customers are reporting 10%-17% longer cycle time with refurbished chucks. We have extensive history on the usage and there is no doubt that this is a viable option.
- **If the refurb unit is "exactly same" as a new unit, why would a refurb unit last longer ?**
- The ESCs are made with a process involving 40 –50 steps. Each step is 'base lined' by OEM. That means the supplier for OEM will follow these steps without any change. What we have done is 'fine tuned' these steps and reduced the process windows on the steps. With tighter control, the performance improves.

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- **What is so special about the materials for flex ?**
- Contrary to what is observed visually, the flex is nowhere similar to what is commonly known as 'flex circuits'. The material is not Kapton and the adhesive is not acrylic. The processes involved are unique and they have to be followed with more discipline than normal flex manufacturing.

- **Can the customer remove the flex and send bare pedestal for refurb. ?**
- Some companies have tried to do this and created more problems.
- Removing flex requires special process that will completely remove the top layer but leaves the pedestal surface untouched. This process was developed over a long time and it is impossible for the customer to duplicate it. Any attempt to remove it mechanically will damage the anodization. This damage is not visible by naked eye. All it takes is a miniscule sized damaged area and the unit will fail at that point after a few hours in chamber because that is the weak point (area of least resistance).

- **How do I know that I will not have some unknown contamination by using the refurb ESCs. ?**
- Refurb ESCs have been in use at many facilities all over the world. They have excellent track record and there has been no report on any cross contamination.

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- **How do I know that the anodization on the refurb ESC I have received is intact?**
- We have developed a surface test for anodization. We screen the entire surface before and after flex placement. If there is any damage to anodization layer, we will remove the layer, clean the base metal and re-plate the layer to the OEM spec.
- **Can I specify that all my pedestals are re-anodized ?**
- Yes, but it is expensive and not necessary. Since we stand by our work and our track record proves our competence, you can leave it to us. Also, re-anodizing every time reduces the thickness. After a few refurbishing cycles, the pedestal might be unusable.
- **I am concerned about the anodization along edge. Is it a valid concern ?**
- If the concern is for particle contamination due to anodization wearing thin, it is not a problem. Due to extended use, the anodization can wear out a little but our cleaning and testing process will ensure the functionality of the pedestal. If the concern is for 'cosmetic' look, it becomes a money issue. By re-anodizing every refurb cycle, the chuck will 'look' nice, but it will cost extra money.