Semicon Synapsis – Carbon Fiber End Effectors

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About Astel Semicon Synapsis

Astel is an Italian company based in Ivrea (Torino), and with a development branch in San Damiano – Monza, close to Milan. The mission of the Semicon Synapsis division is to support the semiconductor and microelectronic companies when a custom solution is needed.

Semicon Synapsis is specialised in the problem solving, and the argument of this presentation, the carbon fiber end effectors, are a good example of what Semicon Synapsis can do.

Semicon Synapsis has good capabilities on the developing of every kind of small equipment and little devices. They are experienced on wafer handling, robots, metrology equipment and devices, manufacturing process control and innovative solutions.

Astel Semicon Synapsis

Carbon Fiber end effectors

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- **Benefits**
  - Using Carbon Fiber End Effectors the customer has many benefits. Here below few point to be considered:
  - OEM Effectors:
    - **If OEM's parts are metallic**, usually they have problems of geometry. The steel arm and the aluminium arm are easy to bend. If bended they must be replaced.
    - **If OEM's parts are ceramic**, in this case they have "the perfect arm", but it is very expensive and fragile.

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- **Benefits (cont'd)**
  - Carbon Fiber End Effectors:
    - Very difficult to break. Impossible to bend permanently.
    - Equipment downtime: huge reduction
    - Possibility to improve the design and introduce customised requirements

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- **Applications**

  - All systems/equipment with end effectors installed are suitable for a retrofit with Semicon Synapsis products
  - **Thickness limits:** for arm with thickness below 1.5 mm contact Astel
  - **Operating Temperature:** the carbon fiber can work in ambient temperature (permanent) up to about 80°C .For higher temperatures contact Astel

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- **Applications (cont'd)**

  - **Peak temperature:** the effector can handle wafers at high surface temperature (up to 350°C with kapton vacuum pads); it is important that the arm is not exposed to temperatures above 80°C for extended period of time.
  - **UV-protection:** if necessary (inside equipment with UV-B or -C exposure), a metal (Stainless Steel) film can be applied over the arm r to prevent any material degradation due to UV exposure.

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- **Packaging**
  - All end effectors are individually bagged and suitable for the installation
- **Warranty**
  - 12 months from shipment (on any manufacturing defects)

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- **Test**
  - Product 100% inspected and all geometric parameters are checked and tested (tolerances, flatness, thickness)

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- **New parts development**
  - To allow Astel to manufacture a new end effector, these are the requirements:
    - 1) (preferred): ask the end user to get a sample of the OEM part (if broken or vested, it does not matter), This part, if possible, will be kept and not returned (unless is a new part) and used for future developments.
    - 2) provide to us all available data and information to produce a sample of the end effector: complete drawing of the end effector with dimension,vacuum connections, equipment where it is installed, application data such as temperature etc.
    - When the first sample will be ready it will be sent to the end user for the qualification.

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- **New parts development (cont'd)**
  - If the sample does not meet the specification and perform as expected, a brief report about the issue encountered will be required, then, if the effector has to be reworked, it shall be sent back to Astel. If the encountered problems require it, we will provide you with a new re-designed sample.
  - This process will end only when the end effector will be qualified unless technical limits will be reached.
  - Up to this point, there won't be any investment by the end user. When the first part is shipped, a testing period of three months starts. After this period we will ask the customer to place an order that will include also the last installed and qualified part or return the parts given.

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- **New parts development (cont'd)**
  - The price of a new end effector usually will be available at the end of the process and price will be competitive vs OPM and OEM price. Price estimation can be given also before making prototypes.

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- **How to order End Effectors?**
  - The order shall be placed to Astel
  - The contact person are:
    - Giorgio Zoly - technical development
      Giorgio.Zoly@semiconsynapsis.com
      Tel. +39-039-2843007
      Fax +39-039-2848182
    - Paola Cena - sales
      p.cena@astel.it
      Tel. +39-0125-230105

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- **Lead time (average)**
  - Usually the shipment is within 2 weeks A.R.O.

- **Minimum Quantity**
  - Usually are 3 or 5 pieces, indicated in the price book with the price.
  - **Important**: if you are interested to quantity below the MOQ, please contact Astel, to consolidate orders and satisfy your requirements

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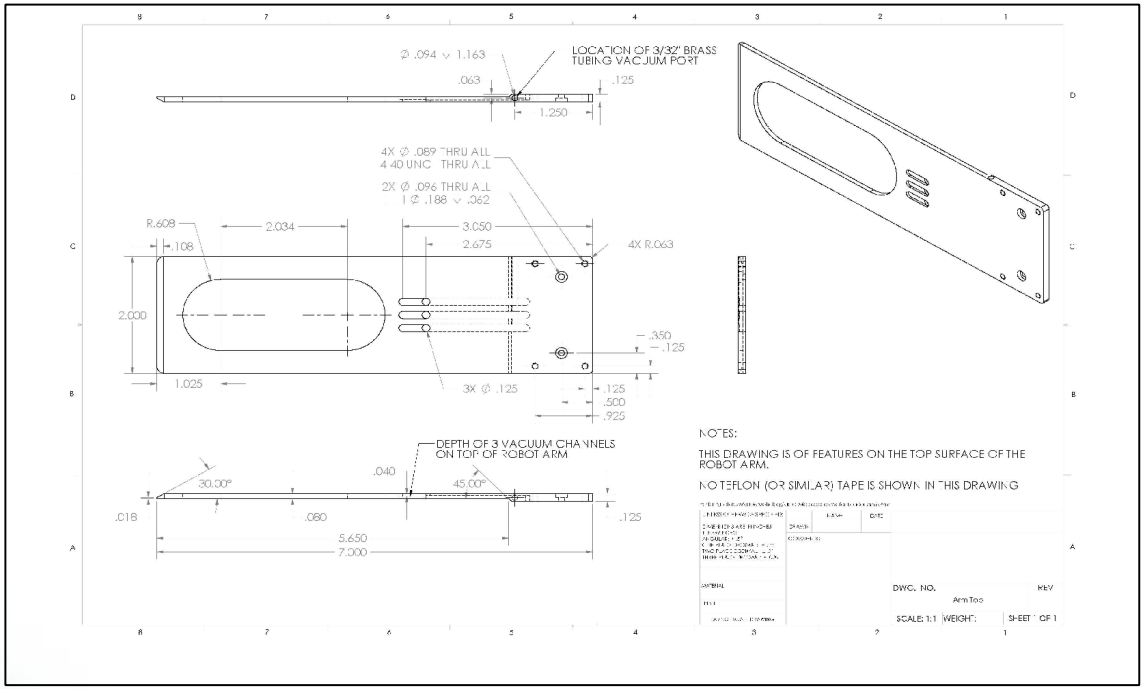
Process

Step 1: drawing



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Process

Step 2: CNC Programming and simulation

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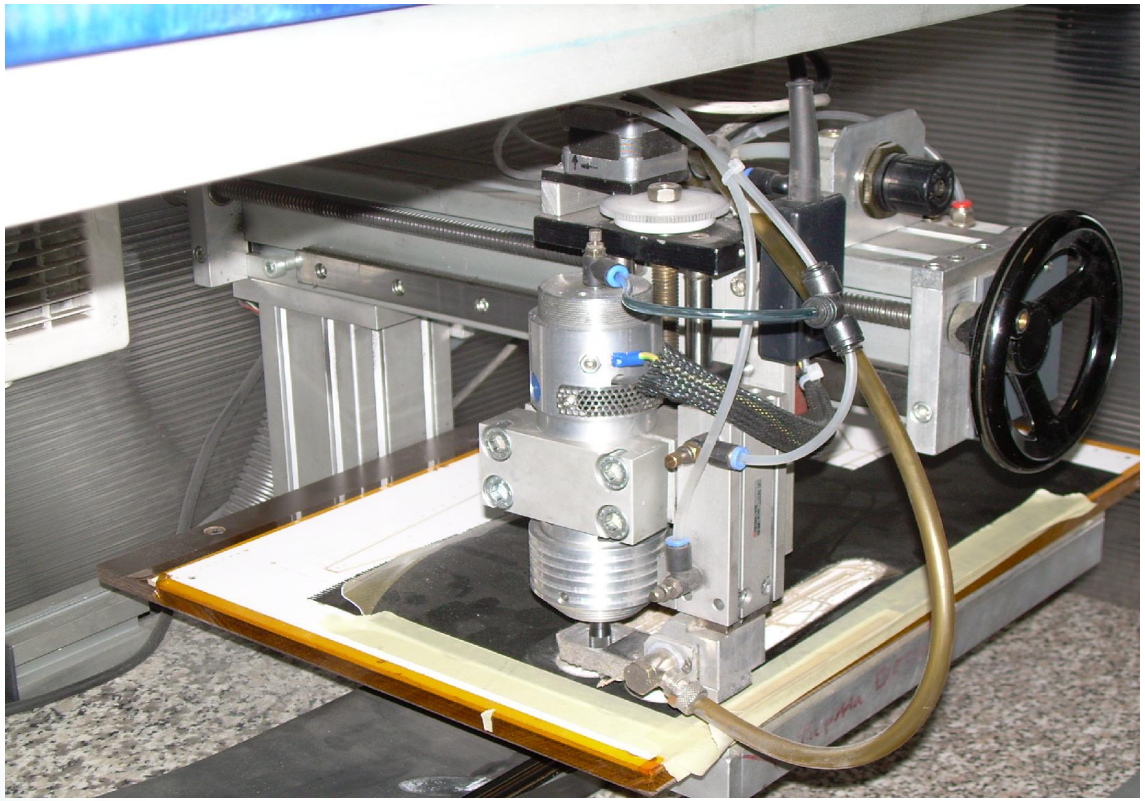
Process

Step 3: CNC Milling



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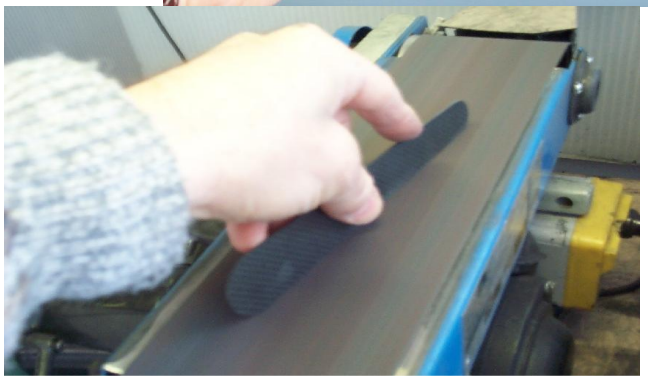
Process

Step 4: layer assembly



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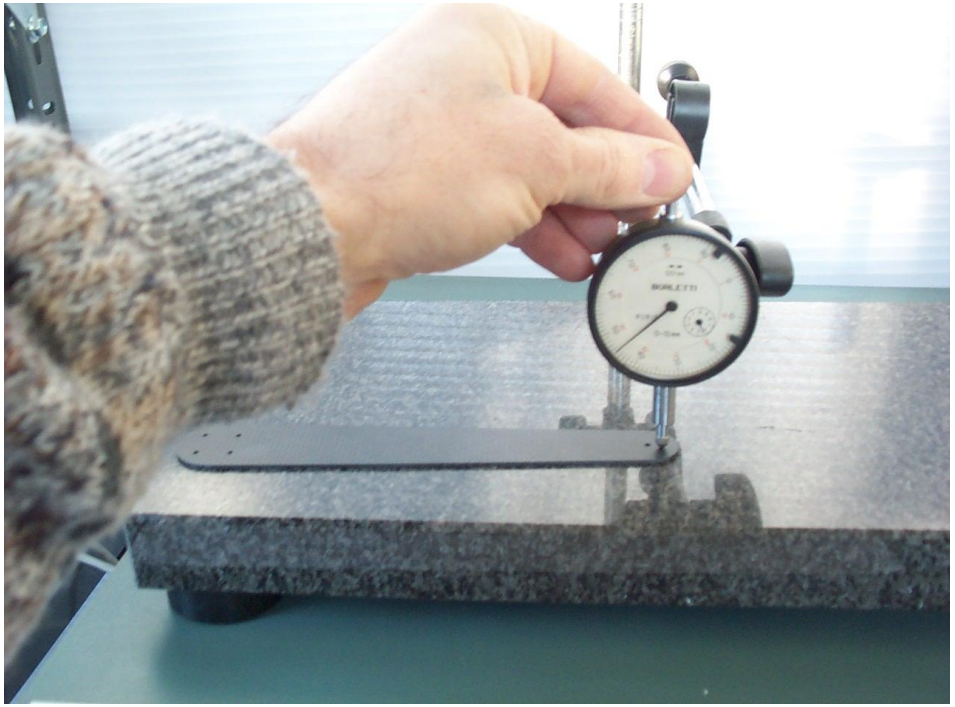
Process

Step 5: testing and cleaning



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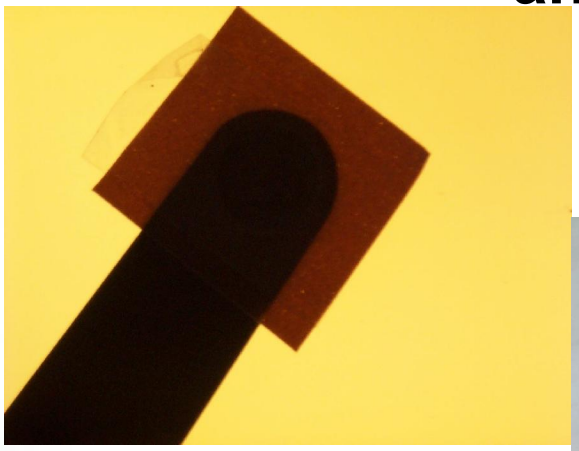
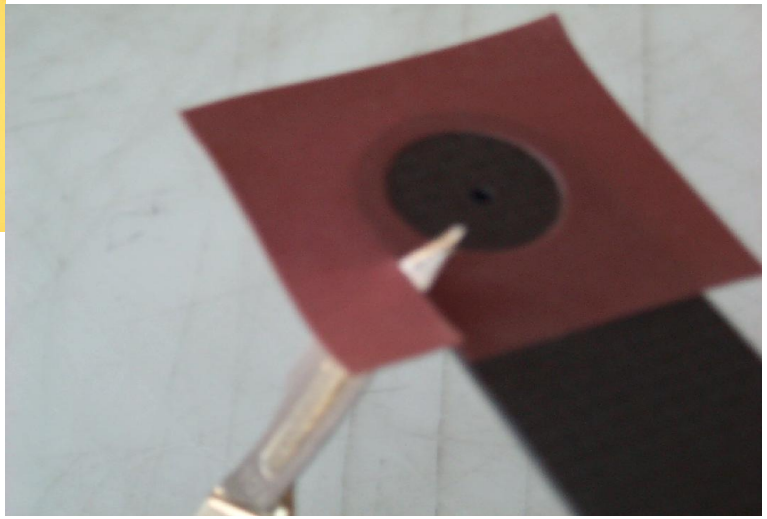
Process

Step 6: vacuum pad assembly and vacuum test





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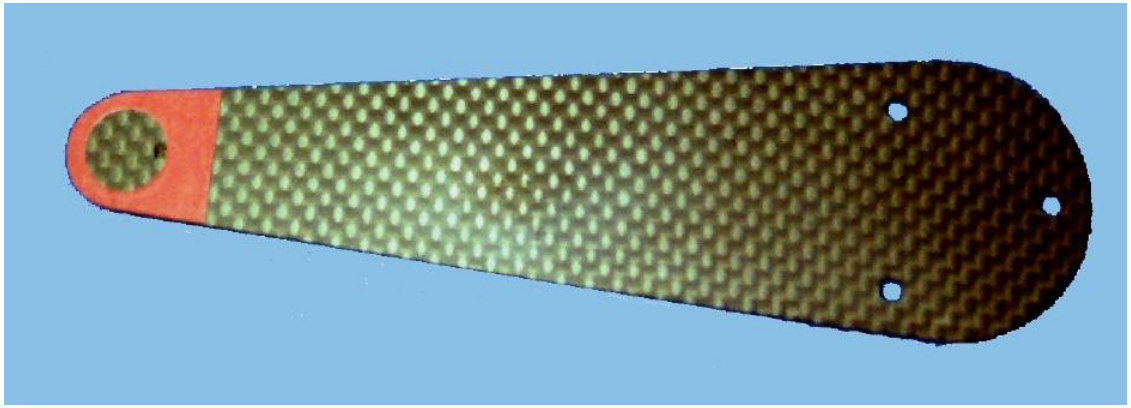
Process

Step 7: the finished part



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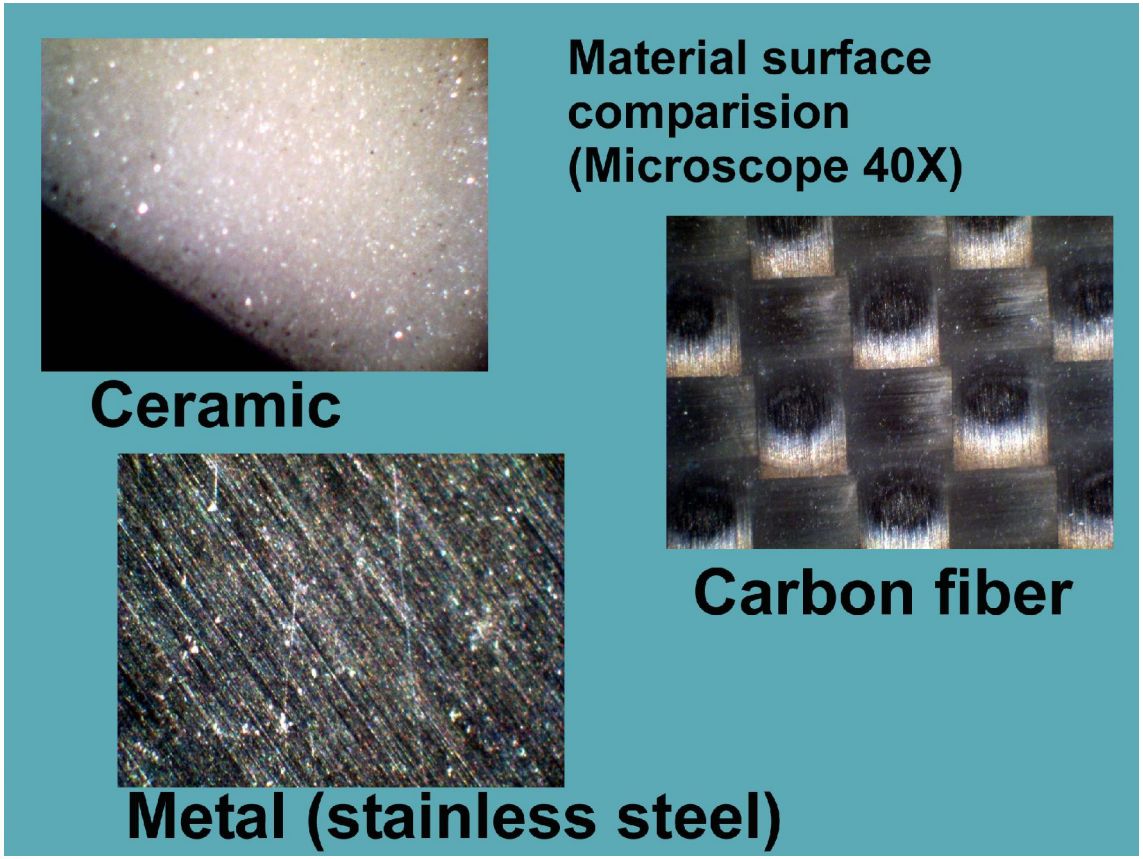
Technical features

Carbon fiber surface finish VS. other materials



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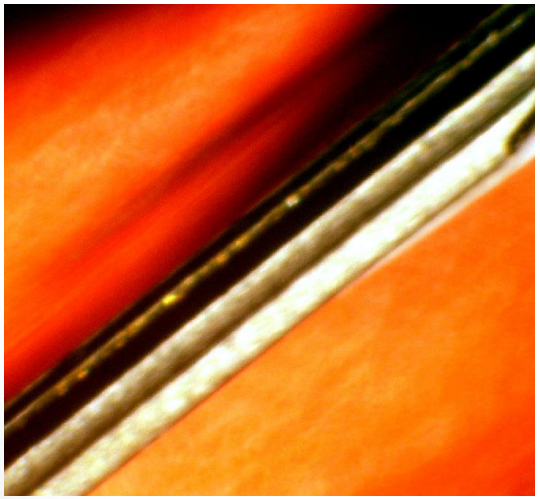
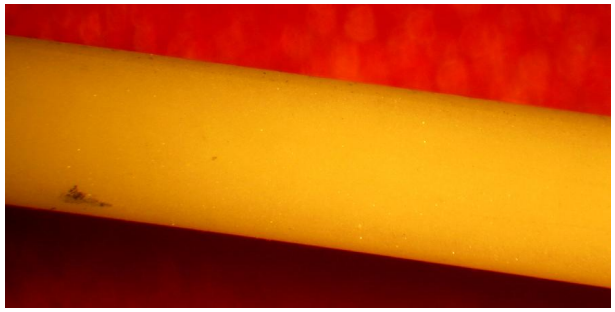
Technical features

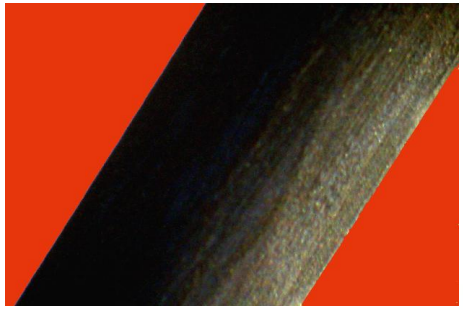
Edge finish (20 X pictures)



Stainless steel edge



Ceramic edge



Carbon fiber edge

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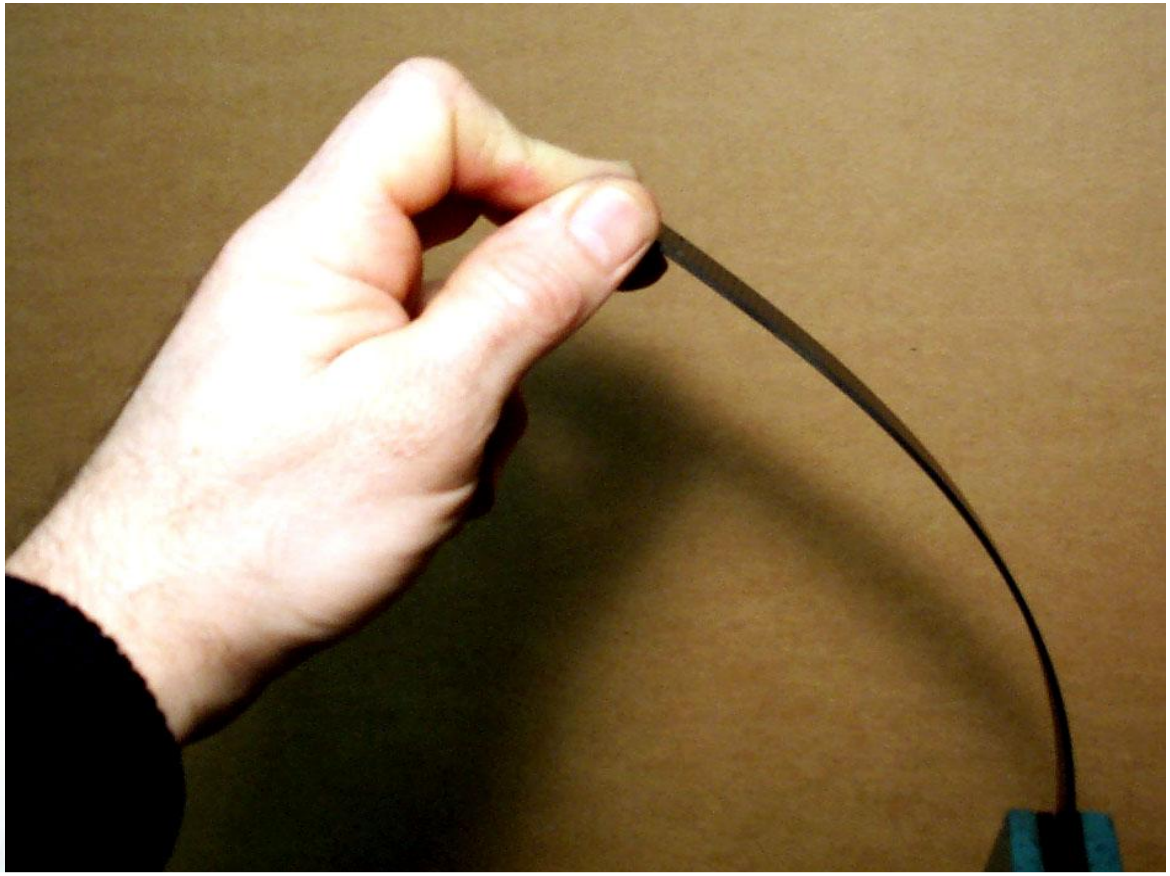
Technical Features

Carbon fiber is flexible



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Technical Features

CONTAMINATION FEATURES:

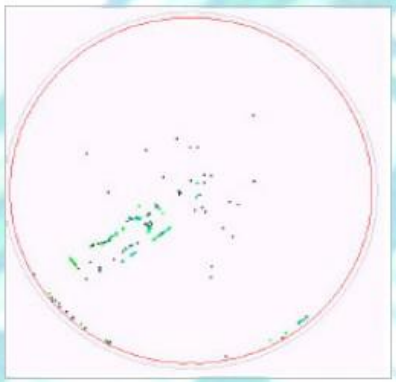
Particle: Particle test on a wafer handling, with contact surface of about 5. cm^2, gave 248 particles in total: no particles on the front side (conditions: 8" wafer, class 1 environment, KLA Surfscan 6200); weekly tests on production tools gave no particle increase on the front side.

SIZE	0.16-0.2	0.2-0.3	0.3-1.0	>1.0	TOTAL
	103	77	52	16	**248**

SYNAPSIS PART

SIZE	0.16-0.2	0.2-0.3	0.3-1.0	>1.0	TOTAL
	113	197	222	172	**704**

ORIGINAL PART



CONTAMINATION MAPS