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## Automatic method to manufacture 2D Multiwire Proportional Counter frames

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One of the most known 2D X-ray detectors is the MWPC (Multiwire Proportional Counter). This is a 2D position sensitive gas detector based in the proportional chamber. It consists of a frame with parallel wires which form a plane (anode) sandwiched between two cathodes planes formed also by parallel wires.

In this job, we describe a complete solution to manufacture anodes and cathodes for a MWPC. The solution consists of a semiautomatic winding machine and a soldering method by radiation. This method allows manufacturing one frame in two hours and with a minimum human intervention. The machine can work with several types of frames and a great accuracy in the position of the wires can be achieved. The idea of making an automatic system of manufacturing arises of several reasons:

- When we work with a big area ( $> 200 \times 200 \text{ mm}^2$ ) MWPC and spatial resolution better than 0.3 mm FWHM in the submillisecond scale, the frames (anode and cathode) need a high accuracy grade in the positioning and the stress of the wires. With the traditional method of soldering (by hand), the accuracy achieved in the positioning was not good enough for our purpose. For example, with wires separated 1 mm, an error of 0.1 mm in the positioning inserts uncertainties of 20% in the gain. Then, when we work with big area detectors, we achieve a non-homogeneous behavior.
- When we operate with a MWPC in synchrotron facilities, the aging is one of the main problems due mainly to the fact that high rate X-rays induce deposits in the frames wires which need to be repaired or changed often. The traditional method to manufacture these frames needs a lot of time and ability. It can take a month to make a set of two cathodes and one anode. For this reason is necessary to dispose of an automatic and fast system for the manufacture of these frames.
- Errors in the stress of the wires necessarily imply an error in the positioning getting the same effect commented in the previous section. For this reason it is very important that all the wires had the same stress and this was as bigger as possible (especially for small diameter wires  $\varnothing 10 \text{ }\mu\text{m}$ ).
- The way of fixing the wires to the frames is to solder with tin. The weldings's shape in the frames must be smooth in order to avoid sparks and broken wires due to discharges, reducing drastically the detector's life. In a set of frames of a big area detector there are more than 1200 weldings, therefore to weld them at the same time all it is a great idea.

In this job we present a system with the following advantages:

1. With this system a fast and accurate method of frame manufacture is achieved. The positioning of the wires improves considerably.
2. The weldings has a smooth shape and avoid the electrostatic discharges.
3. Any technician could work without many problems. It is not necessary he/she was an authentic artisan.

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