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TRAJECTORIES FOR AERONAUTICAL COMPONENTS INSPECTION

The process to generate trajectories for aeronautical components inspection could be divided into five main steps:

1. Acquisition of component geometry.
2. Processing.
3. Generation of trajectories taking into account the ultrasonic parameters.
4. Simulation and export to the language of the control system.
5. Sending movements program to the control system and execution.

1. Acquisition of component geometry

- This process is carried out teaching points of the surface. The needed maneuvers are made from the portable terminal of the control system. A special mechanical probe is mounted in the useful end of the machine.
- A dedicated PLC program controls the machine to take coordinates data when the mechanical probe touch the component surface.
- These points are stored in a file to be processed later on.



View of
mechanical
touch probe



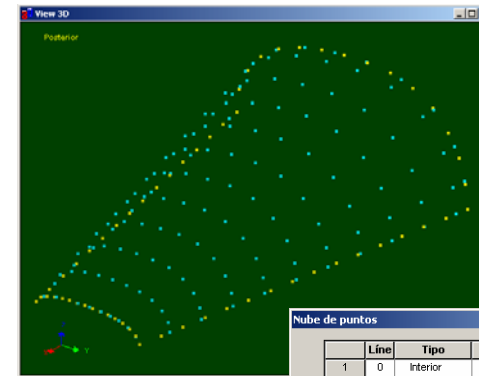
Click on the picture to see a movie

2. Processing



The processing of stored points are made by means of a special software tool named **GENTRAY**.

- GENTRAY is supplied personalized for the current application (machine model, control system, etc...).
- The first step is to select the file of points (load piece).
- The cloud of points can be edited to arrange, to change the point's properties or to eliminate some of them.
- Finally, the surface is reconstructed using NURBS.

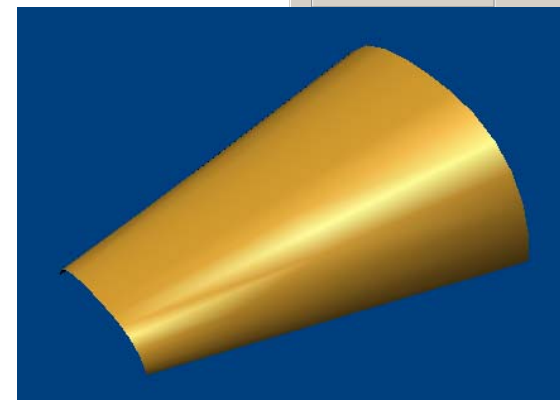


Line	Tipo	X	Y	Z	
1	0	Interior	4907.50	557.50	-1.00
2	0	Interior	4446.50	505.00	-1.00
3	0	Interior	3979.00	451.50	-1.00
4	0	Interior	3506.50	397.50	-1.00
5	0	Interior	3031.50	343.00	-1.00
6	0	Interior	2556.00	288.50	-1.00
7	0	Interior	2079.00	234.00	-1.00

Editar punto Ver/Recalcular superficie

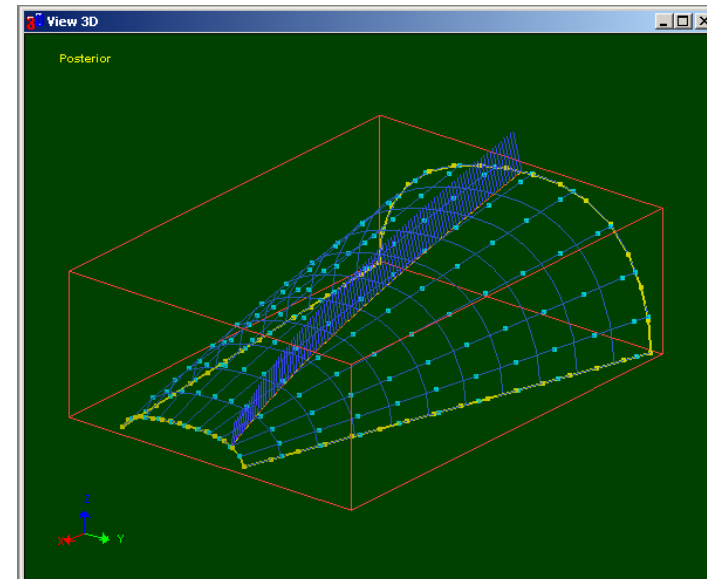
Unir puntos Mostrar numeración de puntos

Guardar fichero Cerrar



3. Generation of trajectories

- The generation of trajectories take into account the ultrasonic requirements:
 - Scan direction
 - Index.
 - Probe holder dimensions.
- GENTRAY calculates the scanning lines (can apply different strategies) and the normal in each point.
- An iterative process assures that correct index is performed in the whole surface.

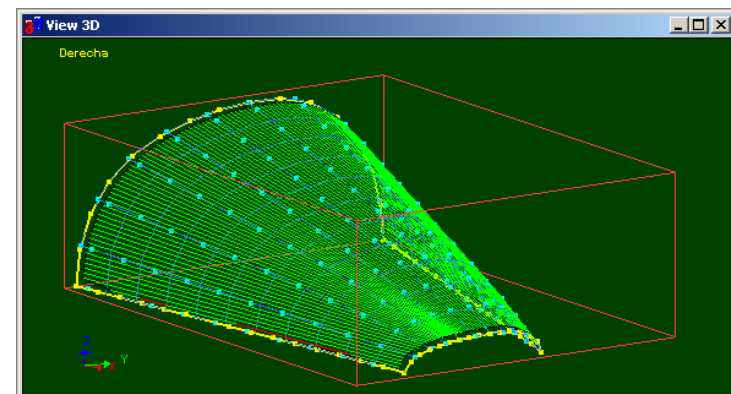


4. Simulation and export

- The trajectory is simulated using a cinematic model of the machine.
- All the process can be seen in a 3D window.
- If the result is satisfactory, the trajectory can be exported to the used controller's language.
- This is made using a special post-processor. This program can insert special pre-written code sections in strategic points of trajectory (star point, start & end of line, start & end of index, end point) in order to implement special functions.

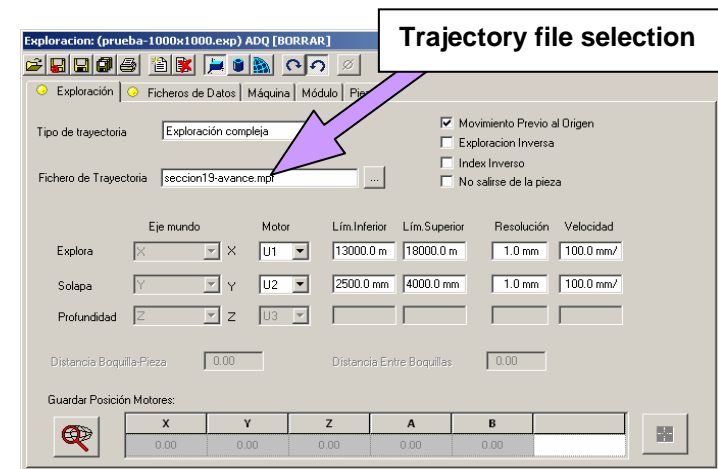


Click on the picture to see a movie



5. Execution

- The exported trajectory is sent to the controller from the data acquisition system that is who supervises the machine operation during the inspection process.
- From the data acquisition system is possible to run the trajectory, to establish pauses, to modify the speed of the machine or to abort the trajectory.
- During the inspection, the data acquisition system reads the position of the machine in real time using a group of auxiliary encoders installed in it.



[Click on the picture to see a movie](#)