

CASE STUDY - CNC Gantry Milling Machine

- **Requirement:** machine potentially contaminated materials using CNC control
- **Location:** UK - restricted area
- **Equipment:** Bespoke CNC gantry mill with automated tool changing, using Mirage drive gearboxes, spindles and linear milling rails with high precision ball screws for repeatability and positional requirements.



Mirage Machines was presented with the problem of multiple machining applications using a single machine within an environment that excluded any access to the machine. The proposed machine had to be capable of providing pocket milling, drilling and tapping within an area of 1.0m x 3.0m. A single access point for exchanging tool bits/cutters was available but very tightly controlled with handling by heavy duty industrial gloves only.

As standard, the CNC controlling hardware had the facility for automatic tool changing which could be incorporated within the Mirage CNC milling machine.

Through customer demand, Mirage engineered the machine using DC motors. Pneumatics were only used for the tool changing actuators, with a controlled exhaust vent as use within such a controlled area could create potential air born complications.

A linear multiple tool rack was introduced to the machine in the vertical position. To prevent the tooling within the tool rack falling out, spring loaded tool capture fingers were used.

The final challenge was to mill, drill and tap with a single spindle DC motor, with each activity requiring varying torque and rpm requirements. Tapping required a higher torque range than could be accommodated within a single DC motor, so CNC controlled thread milling was introduced.

The end result was full CNC control offering positional repeatability using a common datum point, working from a known tool rack position. To further qualify the machine for remote operations, an infrared probe was fitted within the tool rack to seek and find the work area to be machined with all references feeding back into the standard CNC control.