**Kinematics & axes (A/B/C)**

* **Travel ranges** on A and B axis ( real please this time )
* A axis：360° B axis：**﹢**23°﹣90°
* **Rotary drives**: Direct drive (torque motor) vs. **Harmonic Drive** vs. Worm
* **Feedback**: incremental or absolute encoder?

**Spindle**

* **Power & torque**: **Continuous (S1)** power and **torque** in the 10k & 20k rpm
* **Speed range**: min/max; ( 60k max? )
* **Bearings**: hybrid ceramic, lubrication (oil-air/grease), life, service interval.
* **Runout**: ? 0.02mm
* **Cooling**: liquid cooling?

**Linear drives & mechanics**

* **Guides**: profile linear guides (size, preload), assembly quality.

X axis：390 Y axis：345 Z axis：200

* **XYZ drive**: **ballscrews** (accuracy class C1/C3/C5)
* **Gearing**: if not direct, which type (planetary/Harmonic), actual **backlash** & compensation?
* **Servomotors**: brand WEIHONG/HCFA, type Permanent magnet synchronous motor(synchronous/BLDC), **rated torque/power ( X,Y,Z,A,B axis )**, absolute encoders or incremental?

X Y Z A B

Rated Torque 200W 200W 200W 50W 200W

(N.m) / Power (W)

Weihong: 0.64/200 0.64/200 0.64/200 0.64/200 0.64/200

HCFA: 0.64/200 0.64/200 0.64/200 0.16/50 0.64/200

(HCFA servos will be replaced by Weihong servos in the future)

* **Accuracy & repeatability**: stated **positioning accuracy** (µm) and **repeatability** (± µm) for the **entire volume**

**Base/frame & thermal stability**

* **Structure**: cast iron?
* **Thermal control**: active tempering of iron/granite, CNC thermal model, symmetric heat paths.
* **Enclosure**: fully sealed for **wet** titanium machining.

**Workholding C-clamp**

* **Disc system**: 98/98.5 mm, without zero point

**Tooling & ATC**

* **Magazine capacity**: 14?

**Coolant, chips & safety water and oil milling**

* **Wet Ti machining**: coolant type compatibility ( minera, half synthetic,synthetic )?
* **Safety**: leak detection, coolant flow detection?Not yet
* **Safety**: spindle temperature detection? Yes
* **Safety**: door sensor – stop operation when door opened? Not yet
* **Safety**: Stop buttone?Yes

**11) Usability**

* **Noise**: dB(A) during wet Ti cycle.

**12) Installation & utilities**

* **Power**: 230/400 V, total draw, protection.220v 4kw
* **Compressed air**: pressure/flow, air quality (drying/filtration).above 0.60MPA , dry
* **Coolant/water**: tank volume

**Footprint**: floor space, weight (floor capacity), service access requirements0.43㎡ about 233Kg

**13) Service, validation & compliance**

* **Warranty**: term 1 year; what’s covered for spindle/rotaries.
* **Spares**: price/lead time for spare parts
* **Quality systems** ?
* **Safety & CE**: DoC, manuals in EN ?
* **Maintenance**: plan?