

OBJECTIVE

Machine tool sub-system for precision lathes for:

- Machining of oval pistons,
- Machining of mold,
- Machining of non circular optics, non spherical lens,
- Assistance in machining hard materials.

DESCRIPTION

The Servo Piezo Tool uses the patented Amplified Piezo Actuator from CEDRAT TECHNOLOGIES SA to get a fast motion of the diamond tool and includes a eddy current proximity sensor. The SPT400MML is arranged in a casing and dry air is used to expel dust from the casing. The SPT400MML is driven by a standard LA75C drive and the real time UC75 platform. The closed loop is performed with a high sampling rate and realizes the following tasks :

- Closed loop between the SPT and the proximity sensor,
- Monitoring of the different variables of the SPT.

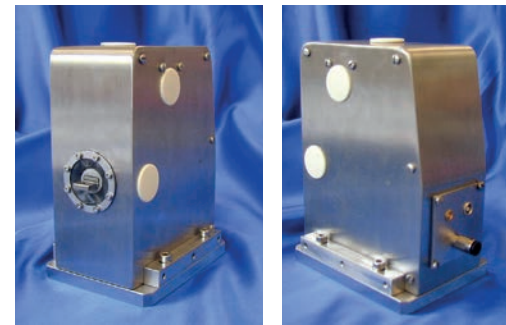


Fig. 1: View of the SPT400MML prototype developed in the frame of the FP6 MASMICRO project

PERFORMANCES OF THE SERVO PIEZO TOOL 400MML

The SPT400MML is compatible with specific diamond tools from Contour Fine Tooling. The performances are obtained with the real time UC75 controller and the LA75C drive.

REMARKS

The technology can be adapted to various dimensions and sizes. For instance a bigger version (displaying much higher force) has been developed for oval piston machining. With diamond tool, a surface roughness better than 10 nm rms has been achieved.

REFERENCES	UNIT	SPT400MML
> Notes		Preliminary
Technology baseline		APA400MML
Stroke(a)	µm	400
Force capability	N	10
Bandwidth (b)	Hz	up to 450
Typical spindle speed	rpm	6000 or 100Hz
Position noise floor (c)	nmRms	15
Linearity (d)	%	2
Resonant frequency		Above 600Hz
Sensor		Eddy current sensor
Excitation voltage	V	-20 to 150
Type of control loop		Feedback control
Tool holder		Light shank 6.35mm cross section
Dimensions	mm	140x100x75
Mechanical interfaces		4m3 holes
Other		Back mass dynamic compensation

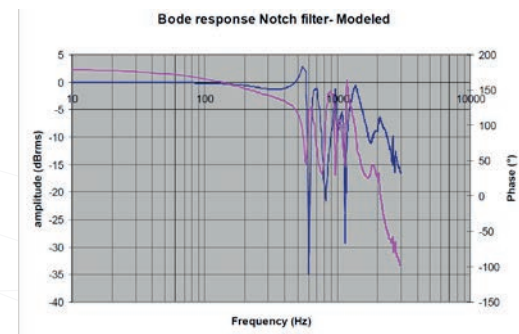


Fig. 2: Bode response in closed loop

Notes: Tambiant 25 °C

(a) <100Hz; 200µm@200Hz,100µm@400Hz

(b) -3dB small signal

(c) Bandwidth DC-500Hz

(d) at 100Hz