
Monad Electronics

G1-805, Sitapura Industrial Area,
Tonk Road, Jaipur-302022

Phone:- +91-141-2771119, Fax:-+91-1412550005

Website:- www.monadindia.com

Email:- mail@monadindia.com, monadindia@yahoo.com



Introduction

Winner of National Award for year 2009-2010 in R&D

Monad Electronics is An ISO 9001:2015 certified company, which has been involved for over 20 year in the business of designing, manufacturing and export of Electronic Industrial products, Testing equipments , sensors and related indicating and controlling devices and allied products related to Data logging & Acquisition.

Monad is specialized in providing high end and high accuracy customized Force Transducers, Multi-Axial Force Transducers and Torque Sensors. Monad is an expert in providing import substitutes of high end Load Cells, Safe Load Indicators, etc

We are supplying to leading industries and government institutions and are also exporting our products to USA, Germany, Belgium, Turkey, Australia, U.A.E., Singapore, Spain, Brazil, New Zealand, Philippines, UK, Croatia and to the African countries.



PIEZO-ELECTRIC BASED CUTTING FORCE DYNAMOMETER

INTRODUCTION

Metal machining processes are characterized mainly by quick changes in quantified elements. Individual changes do not occur in isolation and they influence each other. The analysis of these changes require study of the complicated complete systems in their real situations. The study of cutting processes such as turning and facing, from dynamic aspects, is very important. The trend towards the measurement of cutting forces in machining leads to many theoretical and practical problems. Theoretical problems associate mainly with the choice of a suitable technique to measure, and the statistical methods to analyze the components of cutting force to be determined in realtime. Practical problems involve the errors and uncertainties relating to the measurement system used.

It is not possible to measure directly the cutting forces and their amplitudes at their real origin. The measuring device selected for experiments should be independent of forces and associated movements at the point of application, so that the components of a general force vector can be measured as a reaction of the cutting edge in a defined plane distant from the cutting edge.

It is generally known that the accuracy of cutting force measurement is closely dependent on the quality and sensitivity of the measurement device used. There are also effects of interactive factors associated with the static stiffness of joints in the machine tool work piece systems.

PIEZO-ELECTRIC BASED CUTTING FORCE DYNAMOMETER

In order to obtain true measurements, it should be critically considered if the data, obtained within the limitations of the measuring and evaluating technique used, is repeatable and accurate.

- (1) Error of measurement: any departure from an accepted standard due to imperfection in any part of the measurement system.
- (2) Accuracy: the closeness of readings to an accepted standard.
- (3) Precision: the repeatability of individual readings about their real value.
- (4) Repeatability: the closeness between a number of measurements made at the same time.
- (5) Reliability: confidence in a measurement affected by uncontrollable random factors.
- (6) Reproducibility: the closeness of measurements of the same quantity obtained at different times.
- (7) Scatter: the deviation from a real value of precise reading.

PIEZO-ELECTRIC BASED CUTTING FORCE DYNAMOMETER

Piezoelectric dynamometer is a piezoelectric crystal sensor cutting dynamometer, when the quartz crystal deformation occurs in the external force, in some of its different number appears on the surface polarization charge. This is not the role of the electric field, but due to strain or stress generated within the crystal electrodes of the phenomenon known as the piezoelectric effect. Produced by measuring the amount of charge that can achieve the purpose of cutting force measurements. Measuring force from the dynamic point of view of piezoelectric dynamometer is an ideal measuring force transducers, with high sensitivity, the advantages of force-deformation small.

This dynamometer consists of 6-component force sensors molded between a base plate and cover plate. As piezo sensors are used so force components are measured practically without displacement.

The dynamometer is corrosion-resistant with use of high grade stainless steel cover and protected against spray water and cutting fluid (IP 67sealing).

The sensors are thermally isolated with a special thermal insulation layer which makes the dynamometer largely insensitive to temperature influences.

PIEZO-ELECTRIC BASED CUTTING FORCE DYNAMOMETER

Applications:

- * For measuring cutting forces measuring in milling, grinding and turning
- * Reliable force measurement system
- * Precision milling, Grinding & Turning
- * Ultra Precision Machining
- * High Speed Machining
- * High Precision Hard Turning
- * Wafer Cutting

Features:-

- # Low Thermal Error
- # High Rigidity
- # High natural frequencies
- # Low Threshold
- # Low Profile Design

PIEZO-ELECTRIC BASED CUTTING FORCE DYNAMOMETER

Technical Data:-

1. MEASURING COMPONENTS	Multi components (Six components, 3 Forces: F_x , F_y , F_z & 3 Moments M_x , M_y , M_z)
2. MEASURING RANGE	F_x From -5 to +5 kN F_y From -5 to +5 kN F_z From -5 to +10 kN M_x From -2.5 to +2.5 Nm M_y From -2.5 to +2.5 Nm M_z From -1 to +1 Nm
4. SENSIVITY	F_x : -6 to -9 pC/N, F_y : -6 to -9 pC/N, F_z : -2 to -4 pC/N
5. SAMPLING RATE	10KHz or high
6. LINEARITY	<+0.5
7. HYSTERESIS	<0.5
8. CROSS SENSIVITY	<+2
9. RIGIDITY: C_x, C_y, C_z	0.6 to 0.9 , 0.6 to 0.9, 2 to 3 kn/ μ ohm
10 CAPICITANCES	400-600 (pf)
11 OPERATING TEMPERATURE	0 to 60 degree C
12 INSULATION RESISTANCES	>10 ¹³ (ohm)
13 GROUND INSULATIONS	>10 ⁸ (ohm)

PIEZO-ELECTRIC BASED CUTTING FORCE DYNAMOMETER

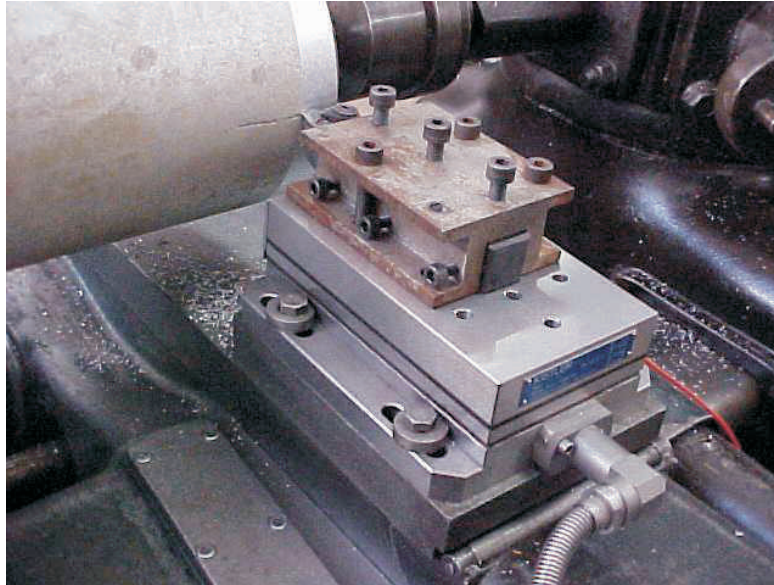
Accessories Included

- Cover
- Mounting screw
- Connector
- Connecting cable

Optional Accessories

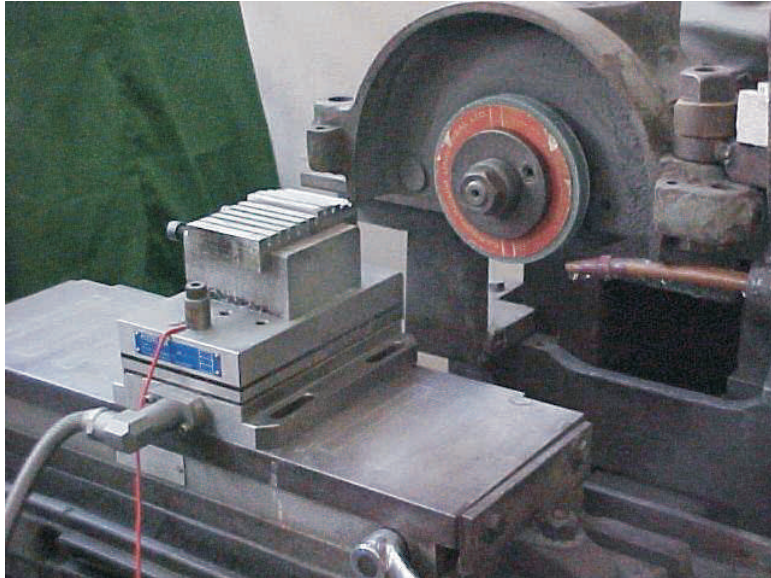
- Tool holder
- * Charge amplifier
- * Data logger

PIEZO-ELECTRIC BASED CUTTING FORCE DYNAMOMETER



piezoelectric type turning dynamometer.

PIEZO-ELECTRIC BASED CUTTING FORCE DYNAMOMETER



Piezoelectric type grinding dynamometer.