

# Lab 1

## Website for information and data:

<http://amet-me.mnsu.edu> -> DATA\_ACQUISITION -> CMM-TE120 -> Fall-2024

## Machine Specifications:

CMM = **C**oordinate **M**easuring **M**achine

Hexagon Global S Green 7.10.7

Workspace = 70 cm on the X  
100 cm on the Y  
70 cm on the Z

Maximum speed = 300 mm/sec

Accuracy = 1.5  $\mu\text{m}$  (0.00006" or 1/16,000")

CMM uses "Air Bearings"

**CMM Training Classes:** [learning.hexagonmi.com](http://learning.hexagonmi.com) (future it will be [nexux.hexagon.com](http://nexux.hexagon.com))

**Vendor:** Productivity Quality Inc. ([pqicalibration.com](http://pqicalibration.com))

15300 25<sup>th</sup> Ave. N, Suite 200  
Plymouth, MN 55447

- 1) **CMM Basics:** Power up, rules to prevent CMM damage, XYZ sensors
- 2) **CMM Uses:** Part dimension tolerance check and reverse engineering
- 3) **PC-DMIS:** offline and online
- 4) **CMM Probes:** Probes used on CMM, file "CMM\_GlobalS\_7-10-7\_ProbesTE120.pdf"
- 5) **Scanning:** Probe moves from 0 Newtons to 0.8 Newtons, then back off to  $0.5 \pm 0.1$  Newtons to measure point.
- 6) **CMM Probe Orientation:**
- 7) **Calibration:** file "ProbeCalibrationInfo.pdf" and calibration pictures
- 8) **Datum reference Frame (DRF):** A mathematically perfect DRF that is overlaid on the imperfect datum features. This should be well defined and probed with numerous points.
- 9) **Cosine error:**
- 10) **Datum Feature Degrees of Freedom Constraint:** 6 degrees of freedom, file "FeatureProperties.pdf"
- 11) **Part Alignment:** file "DatumPrecedenceTable.pdf"
- 12) **CMM program flow chart:** file "FlowChartCMMProgramming.pdf"
- 13) **CAD:** Check your units mm or inches in Creo
- 14) **Write Lab 1 program:** Use meaningful labels