Metrology – NEW Altera C

Measuring Volume

From: 7.7.5	To: 10.7.7

Performance

Volumetric accuracy	from 1.7µm +L/333
Repeatability	from 1.7µm
Velocity	from 500 mm/sec
Acceleration	from 1800 mm/sec2

Probing

PH10T	TP20 / TP200
PH10M	TP20 / TP200 / SP25 / lasers
PH20	TP20

Ceramic guide-ways

Why ceramic?

- 330% stiffer than aluminium
- 250% stiffer than black granite
- 50% stiffer than steel
- 4x more thermally stable than aluminium
- 2x more thermally stable than steel
- approx. 50% lighter than granite (by volume)
- only approx. 32% heavier than aluminium (by volume)

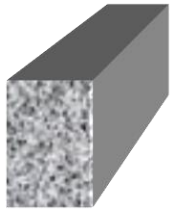
Why large section ceramic?

- increased Y & Z axis air bearing spread
- increased stiffness
- increased stability

standard ceramic
beam: 220mm x 100mm
spindle: 63mm x 63mm

HA and SL ceramic
beam: 375mm x 120mm
spindle: 80mm x 90mm

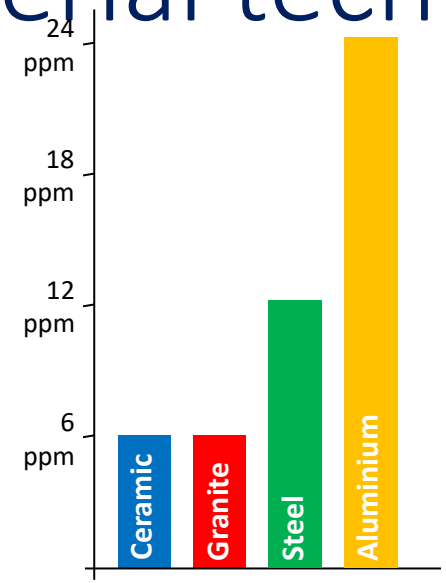
Materials technology

Commonly used materials vs. CMM characteristics	Ceramic 	Granite 	Aluminium 
Thermal stability	✓✓	✓✓	✗
Weight comparison			
Overall rigidly	✓✓✓	✓	✗
Material life expectancy	✓✓	✓	✗
Ultimate CMM accuracy	✓	✓	✗
Beneficial to CMM speed	✓	✗	✓✓

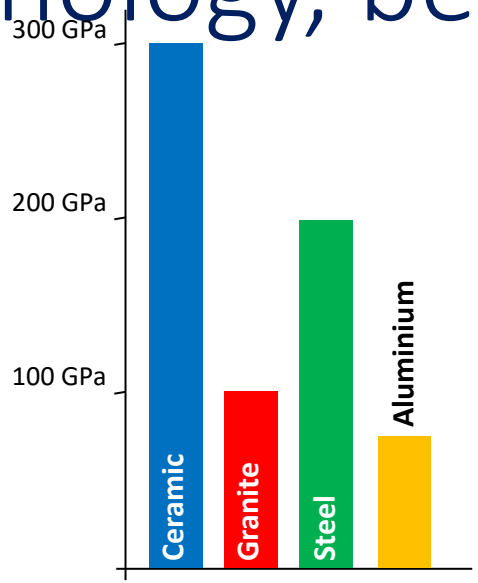
10 YEAR ORIGINAL ACCURACY GUARANTEE

RESULT
Long-lasting CMM performance
10 year structural guarantee

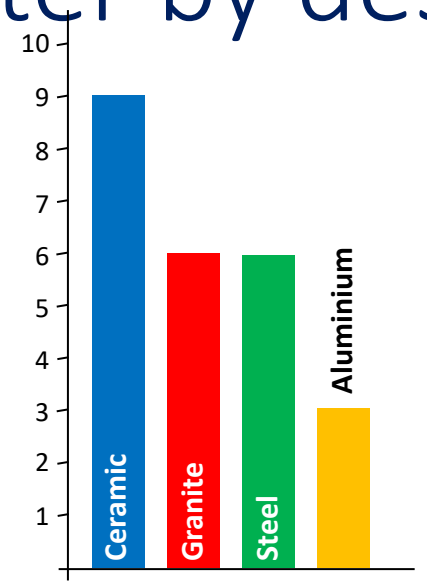
Material technology, better by design



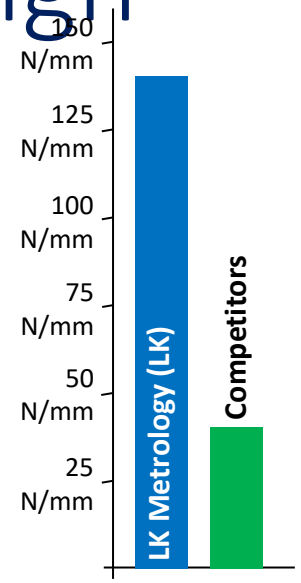
Co-efficient of thermal expansion
The physical ability to withstand deformation through temperature change



Stiffness
The physical property of being hard to bend



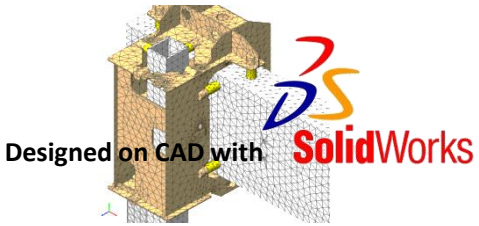
Hardness
The physical property of resistance to scratching from airborne contamination



Air bearing stiffness

Glossary of Terms

- **Alumina Ceramic** – Mono-crystalline Aluminium oxide. (96% Aluminium oxide, 4% Silica-Magnesia-Glass)
- **Co-efficient of Thermal Expansion (CTE)** – value expressed in parts per million for every 1°C of temperature change per metre.
- **Moh's hardness table** – categorises minerals into 10 levels of ascending hardness order where each element point on the scale is able to 'scratch' its predecessor (Diamond =10, Talc = 1)
- **Finite Element Analysis (FEA)** – used to calculate the strength and behaviour of an engineering structure
- (e.g. deflection, stress, vibration and many other phenomena)



Ceramic guide-ways material properties

Material	Youngs Modulus *10^9 Pa	Mass Density Kg/m^3	Stiffness/Mass Ratio *10^7m^2/s^2
Epoxy Resin	10	1200	0.83
White Granite	25	2800	0.89
Invar	140	8130	1.72
Grey Granite	63	3200	1.97
Diabase Black Granite	71.7	3000	2.39
Uni-directional Glass in Epoxy Resin	50	2070	2.4
Aluminum	70	2780	2.52
Steel	200	7800	2.56
Bi-directional XAS-HP Carbon Fibre in Epoxy Resin	55	1520	3.6
Uni-directional Kevlar in Epoxy Resin	82	1360	6
Uni-directional High Tensile Carbon Fibre in Epoxy Resin	105	1580	6.65
96% Alumina Ceramic	303	3700	8.18
Uni-directional High Modulus Carbon Fibre in Epoxy Resin	150	1580	9.5
Reaction Bonded Silicon Carbide	365	3100	11.8

- The stiffness/mass ratio chart shows how much superior the ceramic material is over aluminium, steel and granite.
- Similar to a modern day race cars, the design aim is to produce the stiffest structure with the lowest mass.

10 year structural guarantee

LK Metrology guarantees the dimensional stability of the CMM for 10 years from the date of purchase.

Should LK Metrology not be able to successfully calibrate the CMM to its original specification due to an LK Metrology defined structural component† failure, LK Metrology will repair or replace the structural component at no cost to the customer.

Terms and conditions apply.

Terms and conditions

- the machine is operated in accordance with LK Metrology provided instructions.
- the machine is connected to a proper air and power supply as per the LK Metrology installation drawing.
- only LK Metrology authorised service personnel have carried out planned calibration and maintenance in accordance with the machine manual.
- there is no evidence of tampering, mishandling, neglect, accidental damage or maintenance by anyone other than LK Metrology authorised service personnel.

† Structural components are defined as: the granite table, ceramic beam, ceramic spindle, inside and outside steel legs and the base carriage fabrication.
(excludes: controller, scales, drives, air bearings, motors, etc.)

The company shall have no other or further liability in any respect of any direct or consequential loss or damage sustained by the customer arising from or in connection with any such defect as aforesaid.