Ceramics and Metal Matrix Composites

COGENTUM®

The clear material choice for advanced machine design

COGENTUM® technology provides equipment designers with unparalleled flexibility to improve Semiconductor equipment performance and meet the challenges of advanced Integrated circuit processing and packaging technologies. Incorporating engineered materials expertise and advanced processing methods the COGENTUM® product family represents the next step forward in technology and expands our portfolio of product solutions for high performance machine design.

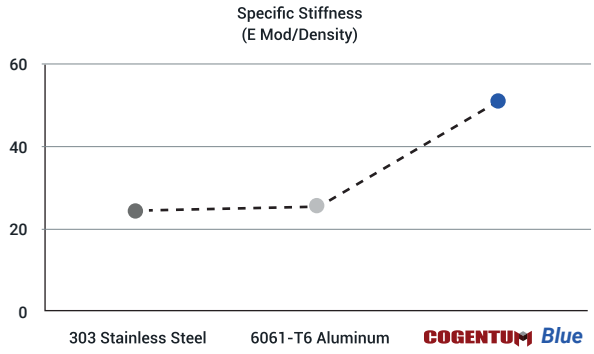
COHERENT

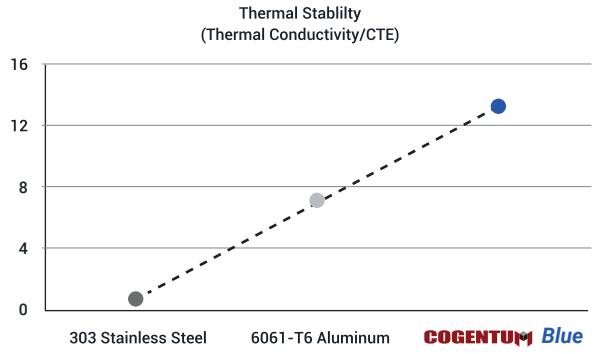
Enabling technology for High performance system accuracy

Manufacturers of advanced back end semiconductor processing equipment are focused on providing their customers with innovative, high performance and cost effective solutions to maintain leading edge and competitive market positions. To maintain a technical leadership position, system accuracy and precision are critical aspects of any advanced machine design.

Specific stiffness and thermal stability

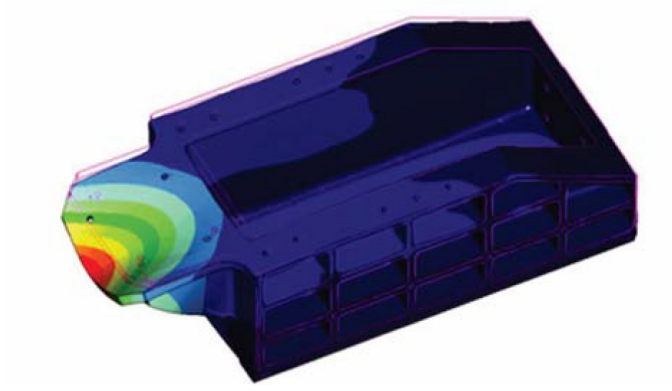
The COGENTUM product line of advanced materials provides designers with the flexibility to optimize the thermal stability: a component's high specific stiffness enables precise and accurate motion in advanced system design. High thermal stability is a function of a material's low coefficient thermal expansion and high thermal conductivity and ensures positional precision and accuracy regardless of thermal micro-climates. Compared to traditional materials, combines both high specific stiffness and high thermal stability to enable precise and accurate advanced machine performance.



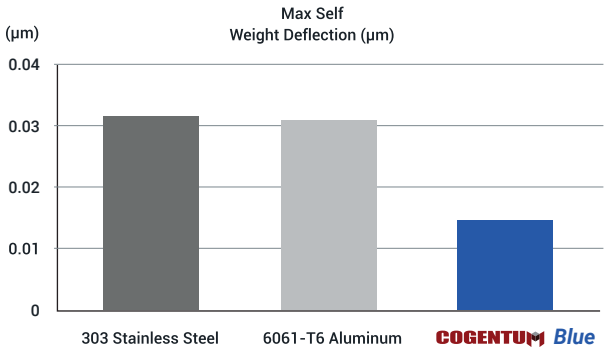


Deflection

Components and structures designed for precision and accuracy in advanced machine designs depend on material characteristics such as density (weight) and modulus (stiffness). A light weight but stiff material will minimize both self-weight and loaded deflections. COGENTUM provides designers with the flexibility to design for minimal deflection without sacrificing other critical aspects of high performance machines.



Deflection Analysis Modeling



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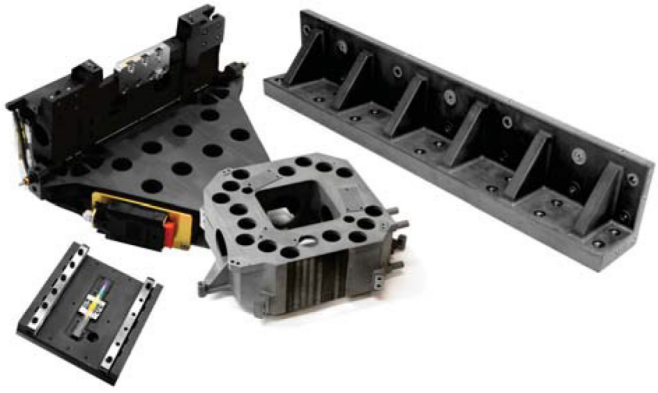
Material Property	COGENTUM® Green	COGENTUM® Blue	COGENTUM® Gold
Density (g/cc) [ρ]	2.78	2.80	2.96
Poisson's Ratio	0.29	0.29	0.25
Young's Modulus - GPa (E)	125	143	200
CTE avg 20-100 ºC (ppm/k) [α]	15	12	11
Thermal Conductivity (W/mK) [k]	160	164	160
Specific Heat (J/kg-K)	820	800	730
Ultimate Tensile Strength (MPa)	370	320	340
Fracture Toughness (MPa-$m^{1/2}$)	15	13	13
Damping Factor (% Zeta)	0.26	0.26	0.58
Specific Stiffness (E/ρ)	45	51	68
Thermal Stability (k/α)	11	14	14

Semiconductor back end of line product examples

Stage structures & assemblies



Wafer handling components

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