MDSD™
Materials Design,
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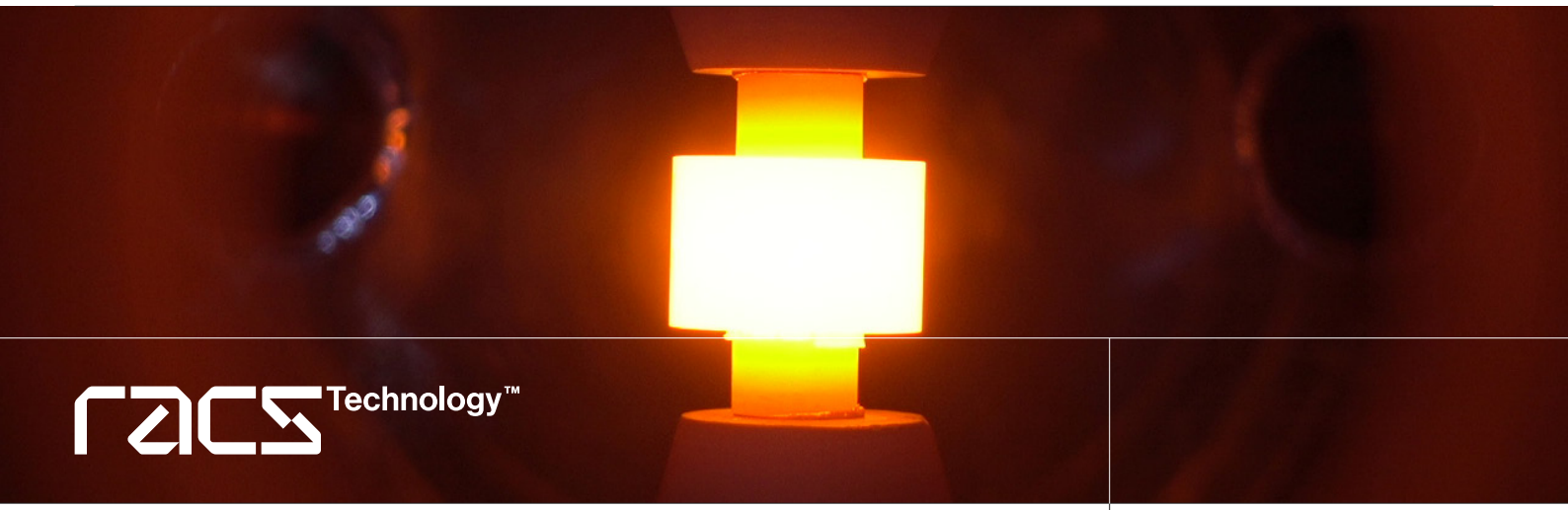

racs Technology™

Resonant Alternating Current Sintering Device

We have pioneered the groundbreaking RACS method, featuring a unique resonant power supply design. This innovative system employs a matching transformer to generate an alternating current (AC) flow within the die and sintered powder material, operating at frequencies ranging from 20 to 60 kHz. Leveraging resonance phenomena, the RACS method facilitates energy accumulation within the system, enabling much higher currents to impact the sintered material than what is achievable with the nominal power of conventional power supplies. This attribute proves particularly advantageous in the context of the FAST current-assisted sintering method.

Distinguished by its superior efficiency compared to conventional DC converters and transformer power supplies, this power supply system minimizes energy loss by utilizing a matching transformer close to the energy receiver. This strategic design choice reduces current requirements within the power supply system, consequently diminishing its physical footprint and component costs. Additionally, it eliminates the need for extensive power cables and multiple contacts, further decreasing energy wastage.

The implications of our proposed solution extend across various industries, including energy, mining, space, military, semiconductor, and tool manufacturing. Notably, RACS technology presents a breakthrough for effectively sintering powder materials, particularly those prone to electromigration at sintering temperatures, such as ionic materials and ionic conductors. Unlike traditional Spark Plasma Sintering (SPS) methods employing DC power supplies, the RACS method eliminates ion migration issues and safeguards against degradation of the resulting sintered materials.

Furthermore, by employing high-frequency AC power, the RACS method offers unprecedented flexibility in terms of frequency, duration, and pulse packet shapes. This versatility, coupled with significantly enhanced energy efficiency, sets RACS apart from SPS devices utilizing low-frequency AC power supplies. In essence, RACS technology revolutionizes material densification, ushering in a new era of SPS applications across a diverse array of materials.

RACS 2S™ Device

SPEC.

Parameter	Value	Unit
Max. pressure	40	kN
Min. pressure	2	kN
Piston stroke	up to 100	mm
Max. working temp.	2 000	°C
Heating rate	up to 500	°C/min
Max. sample diameter	25	mm
Atmosphere in chamber	vacuum ($\leq 2 * 10^{2}$), Ar	mbar
Power	up to 18	kW
Max. peak voltage	up to 12	V
Max. continuous AC current	2 000	A
Pulse (resonance) frequency	25 – 60	kHz
Pulse duration	8 – 20	µs
Cooling water required	50	l/min
Required electrical infrastructure (connection).	1 x 400 V, 32 A, 3 phase, 50 Hz 1 x 400 V, 16 A, 3 phase, 50 Hz	
Programming control (PLC)	SCADA system (AVEVA System Platform)	
Database	MySql/Win/Web Browser	

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