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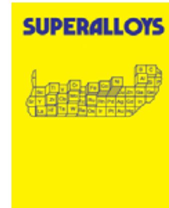

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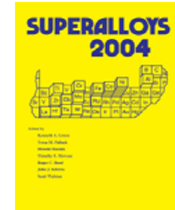

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ALLOY	UNS#	DESCRIPTION	APPLICATION	WEBLINK	SUPERALLOYS 2000	SUPERALLOYS 2004 (link above)
B1900		Common equiaxed casting alloy	turbine airfoils			Mechanical Property and Microstructural Characterization of Vacuum Die Cast Superalloy Materials [pp. 553-562] John J. Schirra, Christopher A. Borg and Robert W. Hatala
C263		Wrought Alloy.			Isothermal and Thermomechanical Fatigue of Superalloy C263 [pp. 545-552] Y.H. Zhang and D.M. Knowles	
CM186LC		Ni-base superalloy, contains Re, outstanding castability, used in as-cast & double aged condition, designed for use in the directionally solidified form	turbine blades	C-M Group	Competitive Grain Growth and Texture Evolution during Directional Solidification of Superalloys [pp. 219-228] M.G. Ardakani, N. D"Souza, A. Wagner, B.A. Shollock and M. McLean	A Study on Bending Deformation Behavior of Ni-Based DS and SC Superalloys [pp. 145 - 153] H. Tamaki, K. Fujita, A. Okayama, N. Matsuda, A. Yoshinari and K. Kakehi
CMSX-10		Nickel-base single crystal, known for strength and castability. Contains Re.	first stage turbine blading	C-M Group	Oxidation Improvements of Low Sulfur Processed Superalloys [pp. 387-392] T.M. Simpson and A.R. Price	Development of Next-Generation Ni-Based Single Crystal Superalloys [pp. 35-43] Yutaka KOIZUMI, Toshiharu KOBAYASHI, Tadaharu YOKOKAWA, ZHANG Jianxin, Makoto OSAWA, Hiroshi HARADA, Yasuhiro AOKI, and Mikiya ARAI Mechanisms of High Temperature Creep of Nickel-Base Superalloys Under Low Applied Stress [pp. 137-143] Alexander Epishin and Thomas Link Nanoindentations as a Local Probe for the Mechanical Properties and Alloying Influences in Nickel-Base Superalloys and Aluminide Coatings [pp. 467-476] K. Durst, O. Franke, M. Göken Segregation of Elements in High Refractory Content Single Crystal Nickel Based Superalloys ppp. 811-818] E. C. Caldwell,F. J. Fela, G. E.Fuchs
CMSX-3		Hf addition to CMSX-2	Turbine blade & vane airfoils	C-M Group		

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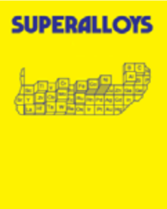

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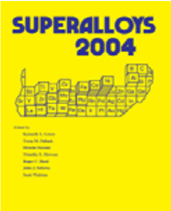

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ALLOY	UNS#	DESCRIPTION	APPLICATION	WEBLINK	SUPERALLOYS 2000	SUPERALLOYS 2004 (link above)
CMSX-4		"single crystal material hardenened by about 70 vol%-gamma' with solid solution strengthening of the gamma channels in-between the cuboidal gamma' particles due to the addition of 3 wt% Re" (Schubert, Rieck, and Ennis)	Industrial gas turbine airfoils	C-M Group	Competitive Grain Growth and Texture Evolution during Directional Solidification of Superalloys [pp. 219-228] M.G. Ardakani, N. D"Souza, A. Wagner, B.A. Shollock and M. McLean	Improved Single Crystal Superalloys, CMSX-4 (SLS)[La+Y] and CMSX-486 [pp. 45-52] Ken Harris, Jacqueline B. Wahl
					Modelling of the Microsegregation in CMSX-4 Superalloy and Its Homogenisation During Heat Treatment [pp. 263-272] M.S.A. Karunaratne, D.C. Cox, P. Carter and R.C. Reed	Single Crystal Superalloys: The Transition from Primary to Secondary Creee [pp. 127-136] G.L. Drew, R.C. Reed*, K. Kakehi**, and C.M.F. Rae
					Prediction and Measurement of Microsegregation and Microstructural Evolution in Directionally Solidified Superalloys [pp. 313-322] B. Böttger, U. Grafe, D. Ma and A. Schnell	Mechanisms of High Temperature Creep of Nickel-Base Superalloys Under Low Applied Stress [pp. 137-143] Alexander Epishin and Thomas Link
					The Growth of Small Cracks in the Single Crystal Superalloy CMSX-4 at 750 and 1000°C [pp. 341-346] F. Schubert, T. Rieck and P.J. Ennis	On TMF Damage Degradation Effects, and the Associated Tmin Influence on TMF Test Results in Gamma/Gamma' Alloys [pp. 291-294] D. Arrell, M. Hasselqvist, C. Sommer, J. Moverare
					The Influence of Load Ratio, Temperature, Orientation and Hold Time on Fatigue Crack Growth of CMSX-4 [pp. 347-356] S. Müller, J. Rösler, C. Sommer and W. Hartnagel	Nanoindentations as a Local Probe for the Mechanical Properties and Alloying Influences in Nickel-Base Superalloys and Aluminide Coatings [pp. 467-476] K. Durst, O. Franke, M. Göken
					Modelling the Anisotropic and Biaxial Creep Behaviour of Ni-Base Single Crystal Superalloys CMSX-4 and SRR99 at 1223K [pp. 357-366] D.W. MacLachlan, L.W. Wright, S.S.K. Gunturi and D.M. Knowles	Design of Nanoporous Superalloy Membranes by Self-Assembly of the Gamma' Phase [pp. 501-506] Joachim Rosler, Oliver Nath, Fabian Schmitz, Debashis Mukherji

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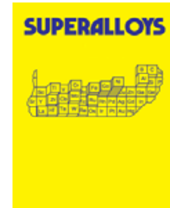

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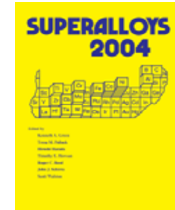

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ALLOY	UNS#	DESCRIPTION	APPLICATION	WEBLINK	SUPERALLOYS 2000	SUPERALLOYS 2004 (link above)
					Oxidation Improvements of Low Sulfur Processed Superalloys [pp. 387-392] T.M. Simpson and A.R. Price	Effects of Segregation in Nickel-Base Superalloys: Dendritic Stresses [pp. 537-544] Alexander Epishin, Thomas Link, Udo Brückner, Bernard Fedelich and Pedro Portella
					Effects of Local Cellular Transformation on Fatigue Small Crack Growth in CMSX-4and CMSX-2 at High Temperature [pp. 505-514] M. Okazaki, T. Hiura and T. Suzuki	Some Effects of Carbon in the Production of Single Crystal Superalloy Castings [pp. 795-800] John R. Mihalisin, John Corrigan, Michael Launsbach, Eric Leonard, Robert Baker, Brian Griffin
						Solidification Characteristics of Advanced Nickel-Base Single Crystal Superalloys [pp. 819-826] R.A. Hobbs, S. Tin, C.M.F. Rae, R.W. Broomfield and C.J. Humphreys
						The Effects of Different Alloying Elements on the Thermal Expansion Coefficients, Lattice Constants and Misfit of Nickel=Based Superalloys Investigated by X-Ray Diffraction [pp. 827-836] Florian Pyczak , Bastian Devrient , Hael Mughrabi
						The Application of Neural Network to the Development of Single Crystal Superalloys [pp. 941-950] Y.S. Yoo, I. S. Kim, D. H. Kim, C.Y. Jo, H. M. Kim, and C.N. Jones
						The Sensitivity of Investment Casting Simulations to the Accuracy of Thermophysical Property Values [pp. 951-958] X. L. Yang, P. D. Lee, R. F. Brooks, R.Wunderlich
CMSX486		Nickel-base single crystal superalloy. Grain boundary strengthened By B, C, Hf & Zr. Resistant to thermal fatigue, low-cycle fatigue and oxidation.	vanes and vane segments	C-M Group		

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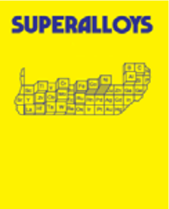

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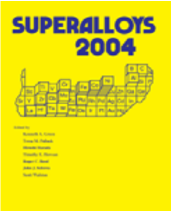

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ALLOY	UNS#	DESCRIPTION	APPLICATION	WEBLINK	SUPERALLOYS 2000	SUPERALLOYS 2004 (link above)
GTD 222		polycrystalline, Ni-Co-Cr-W	stationary steam cooled land based gas turbine airfoil components	C-M Group MatWeb	Improving Properties of Single Crystal to Polycrystalline Cast Alloy Welds through Heat Treatment [pp. 721-726] A.E. Kolman	
Inconel 713C		high temperature ductility and strength, no heat treatment necessary for attaining required properties, candidate for continuous casting	precision cast parts for hot-end turbo-charger wheels	C-M Group	Structure of the Ni-Base Superalloy IN713C after Continuous Casting [pp. 239-246] F. Zupanic, T. Boncina and A. Krizman	
Inconel 713LC		Nickel-base equiaxed cast alloy.		C-M Group		
Inconel 738 LC		gamma and gamma'-(Ni3Al)	combustion turbine blade airfoil		The Thermal Analysis of the Mushy Zone and Grain Structure Changes during Directional Solidification of Superalloys [pp. 247-254] S.U. An, V. Larionov, V. Monastyrski, E. Monastyrskaia, I. Grafas, J.M. Oh, O.D. Lim, Stress Rupture Behavior of Waspaloy and IN-738LC at 600°C (1112°F) in Low Oxygen Gaseous Environments Containing Sulfur [pp. 535-544] D.C. Seib Interdiffusion Behavior in NiCoCrAlYRe-Coated IN-738 at 940° and 1050°C [pp. 649-654] K.A. Ellison, J.A. Daleo and D.H. Boone	An Influence of Microstructure on the Mechanical Properties of the Corrosion Resistant Superalloy CHS88U [pp. 779-786] E. V. Monastyrskaia,E. V. Petrov, V. E. Beljaev, A. M. Dushkin
Inconel 939		Ni-Cr-Co casting alloy with improved strength at elevated temperatures, but not as amenable to weld repair as IN718.	aircraft propulsion system components	Volvo	Properties of RS5 and Other Superalloys Cast Using Thermally Controlled Solidification [pp. 161-170] M.L. Gambone, S.B. Shendye, P. Andrews, W. Chen, M.N.	Evaluation of the IN 939 Alloy for Large Aircraft Engine Structures [pp. 441-450] Göran Sjöberg , DzevadImamovic, Johannes Gabel, Oscar Caballero, JefferyW Brooks, Jean- Pierre Ferté , Ariane Lugan

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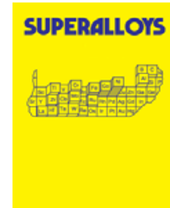

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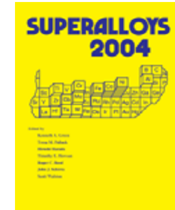

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ALLOY	UNS#	DESCRIPTION	APPLICATION	WEBLINK	SUPERALLOYS 2000	SUPERALLOYS 2004 (link above)
				C-M Group		Mechanical Property and Microstructural Characterization of Vacuum Die Cast Superalloy Materials [pp. 553-562] John J. Schirra, Christopher A. Borg and Robert W. Hatala
Mar M 200		Nickel-base equiaxed cast alloy.		C-M Group		Primary Creep in Nickel-Base Superalloys [pp. 197-206] Dilip M. Shah, S. Vega, S. Woodard, Alan D. Cetel
Mar M 246		Nickel-base equiaxed cast alloy.		C-M Group		
Mar M 247		Common nickel-based,equiaxed casting alloy, no Re	integrally bladed turbine wheels, turbine airfoils	C-M Group	Advanced Superalloys and Tailored Microstructures for Integrally Cast Turbine Wheels [pp. 171-179] R.C. Helmink,, R.A. Testin, A.R. Price, R. Pachman, G.L. Erickson, K. Harris, J.A. Nesbitt and J.F. Radavich	Superalloy Lattice Block Structures [pp. 431-439] M.V. Nathal, J.D. Whittenberger, M.G. Hebsur, P.T. Kantzos, and D.L. Krause Mechanical Property and Microstructural Characterization of Vacuum Die Cast Superalloy Materials [pp. 553-562] John J. Schirra, Christopher A. Borg and Robert W. Hatala The Effects of Water Vapor on the Oxidation of Nickel-Base Superalloys and Coatings at Temperatures From 700°C to 1100°C [pp. 607-616] K. Onal, M. C. Maris-Sida, G. H. Meier, F. S. Pettit
Mar M 509		common equiaxed casting alloy, Cobalt-based	turbine airfoils			Mechanical Property and Microstructural Characterization of Vacuum Die Cast Superalloy Materials [pp. 553-562] John J. Schirra, Christopher A. Borg and Robert W. Hatala A New Method of Metal Temperature Estimation For Service-Run Blades and Vanes [pp. 759-768] K. A. Ellison, J. A. Daleo, K. Hussain
PWA 1480		Nickel base single crystal alloy.				Primary Creep in Nickel-Base Superalloys [pp. 197-206] Dilip M. Shah, S. Vega, S. Woodard, Alan D. Cetel

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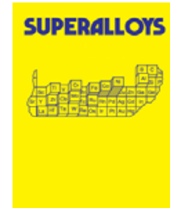

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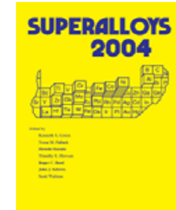

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ALLOY	UNS#	DESCRIPTION	APPLICATION	WEBLINK	SUPERALLOYS 2000	SUPERALLOYS 2004 (link above)
PWA 1484		Ni-Co-Cr-Al-Ta-W-Mo-Re single crystal alloy (no Ti)			Oxidation Improvements of Low Sulfur Processed Superalloys [pp. 387-392] T.M. Simpson and A.R. Price	Primary Creep in Nickel-Base Superalloys [pp. 197-206] Dilip M. Shah, S. Vega, S. Woodard, Alan D. Cetel Some Effects of Carbon in the Production of Single Crystal Superalloy Castings [pp. 795-800] John R. Mihalisin, John Corrigan, Michael Launsbach, Eric Leonard, Robert Baker, Brian Griffin
Rene 220		Nickel-base equiaxed cast alloy with enhanced temperature capability and weldability with respect to 718. As compared to 718, Rene 220 has Co instead of Fe and the latter also has Ta.	Structural castings such as turbine frames.	Crucible Research		
Rene 80		Cast nickel-base superalloy. Has been studied in conventionally cast form and in directionally solidified and single crystal forms.	first stage gas turbine blades in jet engines	Reade Advanced Materials C-M Group		
Rene N4		single crystal cast Ni based superalloy				Issues in Processing by the Liquid-Sn Assisted Directional Solidification Technique [pp. 421-430] A.J. Elliott, G.B. Karney, M.F.X. Gigliotti, and T.M. Pollock
Rene N5		single crystal cast Ni based superalloy	steam cooled land based gas turbine airfoil components		Oxidation Improvements of Low Sulfur Processed Superalloys [pp. 387-392] T.M. Simpson and A.R. Price , Improving Properties of Single Crystal to Polycrystalline Cast Alloy Welds through Heat Treatment [pp. 721-726] A.E. Kolman	Analysis of Stray Grain Formation in Single-Crystal Nickel-Based Superalloy Welds [pp. 459-470] J.M. Vitek, S.S. Babu, J-W. Park, and S.A. David The Effects of Water Vapor on the Oxidation of Nickel-Base Superalloys and Coatings at Temperatures from 700°C to 1100°C [pp. 607-616] K. Onal, M.C. Maris-Sida. G.H. Meier, and F.S. Pettit
Rene N6		single crystal cast Ni based superalloy				Segregation of Elements in High Refractory Content Single Crystal Nickel Based Superalloys ppp. 811-818] E. C. Caldwell,F. J. Fela, G. E.Fuchs

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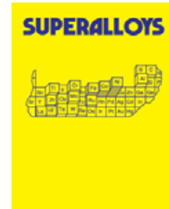

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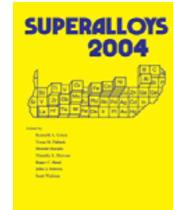

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ALLOY	UNS#	DESCRIPTION	APPLICATION	WEBLINK	SUPERALLOYS 2000	SUPERALLOYS 2004 (link above)
TMS-138		NIMS' 4th generation Ni-Co-Cr-Mo-W-Al-Ta single crystal alloy to which Re & Ru was added. High volume fraction of gamma'				Creep Deformation Mechanisms in Some Modern Single-Crystal Superalloys [pp. 189-195] J.X. Zhang, T. Murakumo, H. Harada, Y. Koizumi, T. Kobayashi The Formation of SRZ On a Fourth Generation Single Crystal Superalloy Applied With Aluminide Coating [pp. 637-642] Y. Matsuoka, Y. Aoki, K. Matsumoto, A. Satou, T. Suzuki,K. Chikugo, and K. Murakami
TMS-162		NIMS' newest Ni-Co-Cr-Mo-W-Al-Ta single crystal alloy to which Re & Ru was added. High volume fraction of gamma'.				Creep Deformation Mechanisms in Some Modern Single-Crystal Superalloys [pp. 189-195] J.X. Zhang, T. Murakumo, H. Harada, Y. Koizumi, T. Kobayashi
TMS-75		NIMS' 3rd generation Ni-Co-Cr-Mo-W-Al-Ta single crystal alloy containing Re additions. High volume fraction of gamma'.				Creep Deformation Mechanisms in Some Modern Single-Crystal Superalloys [pp. 189-195] J.X. Zhang, T. Murakumo, H. Harada, Y. Koizumi, T. Kobayashi A Comparative Study of Thermo-mechanical Fatigue of Two Ni-Based Single Crystal Superalloys [pp. 225-232] H. Zhou, M. Osawa, H. Harda, T. Yokokawa, Y. Koizumi, T. Kobayashi, M.Waki, Y. Ro, andI. Okada Weldability of Directionally Solidified TMS-75 and TMD-103 Superalloys [pp. 529-536] Y.L. Wang, X. Yu, N.L. Richards & M.C. Chaturvedi Application of Ir-Base Alloys To Novel Oxidation Resistant Bond-Coatings [pp. 589-596] H. Murakami, A. Suzuki F. Wu, P. Kuppusami, and H. Harada 3D-FEM Calculations of Rafting in Ni-base Superalloys Based on High Temperature Elastic and Lattice Parameters [pp. 977-988] M. Osawa, H. Shiraishi, T. Yokokawa, H. Harada, and T. Kobayashi