

*Neutron Absorber*

**MAXUS<sup>®</sup>**

*Metal Matrix Composite*

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**MAXUS**<sup>®</sup>  
 Metal Matrix Composite

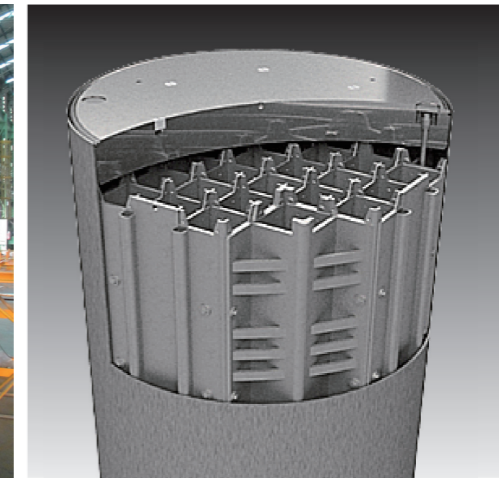
MAXUS<sup>®</sup> is a high-density neutron absorber used in the spent nuclear fuel dry storage and/or transportation casks as well as in the racks of spent nuclear fuel pools.

MAXUS<sup>®</sup> consists of a sandwich structure with a highly corrosion-resistant aluminium alloy cladding, and boron carbide powder uniformly distributed within a high-purity aluminium matrix.

With MAXUS<sup>®</sup>, Nikkeikin ACT (a 100% owned subsidiary of Nippon Light Metal Holdings), has realized an unprecedented high performance material that meets customer expectations by effectively combining the knowledge and expertise of each NLM Holdings business division.



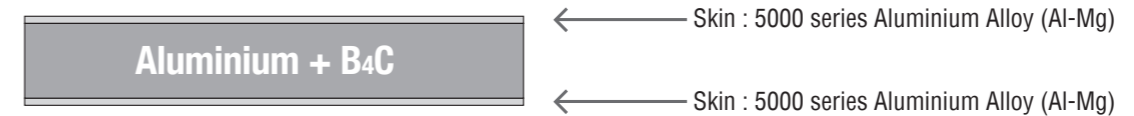
MAXUS<sup>®</sup> for use in dry storage casks



Photos: NAC INTERNATIONAL Inc.

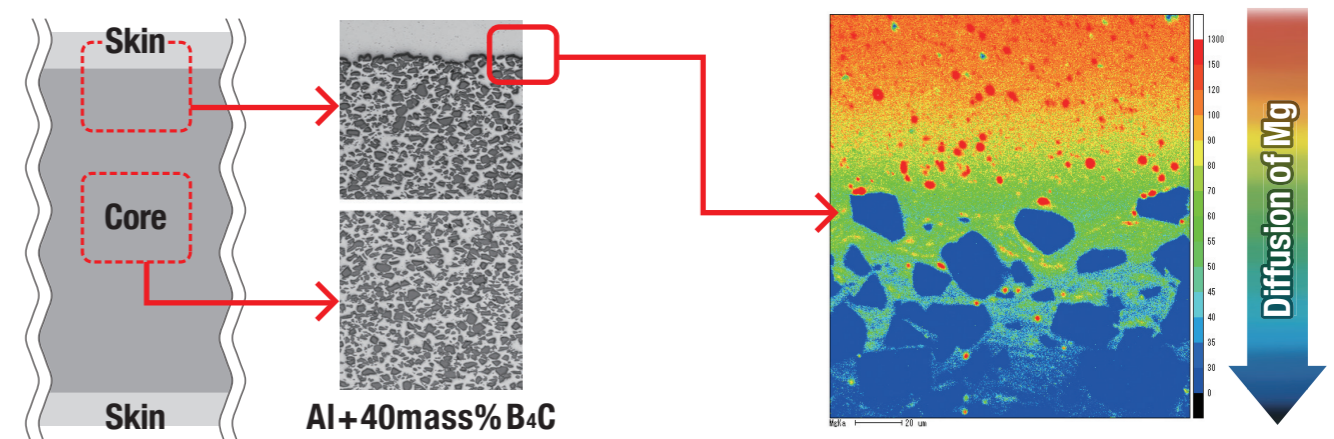
### Cross Section

MAXUS<sup>®</sup> is particularly resistant to corrosion thanks to the use of 5000 series aluminium alloy cladding and high purity aluminium matrix (purity ≥ 99.7%). By adjusting the amount of boron carbide powder included in the matrix, typically from 20 to 40 mass%, and the thickness of the plate, typically from 2 to 10 mm, MAXUS<sup>®</sup> can be customized at diverse <sup>10</sup>B areal densities, covering a very wide range of applications.



### Microstructure

Through several years of research and development, MAXUS<sup>®</sup> has achieved a very high uniform distribution of boron carbide particles in the aluminium matrix, as well as a very high specific density – close to 100% of theoretical. The advanced manufacturing process of MAXUS<sup>®</sup> also allows for strong bonding between the clad and the core through the diffusion of Mg in the 5000 series aluminium alloy cladding, guaranteeing no delamination and no degradation during service life.



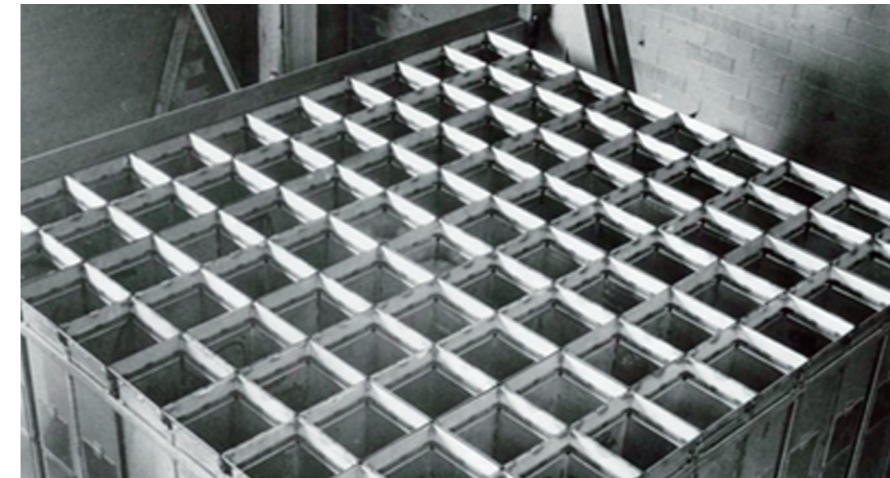
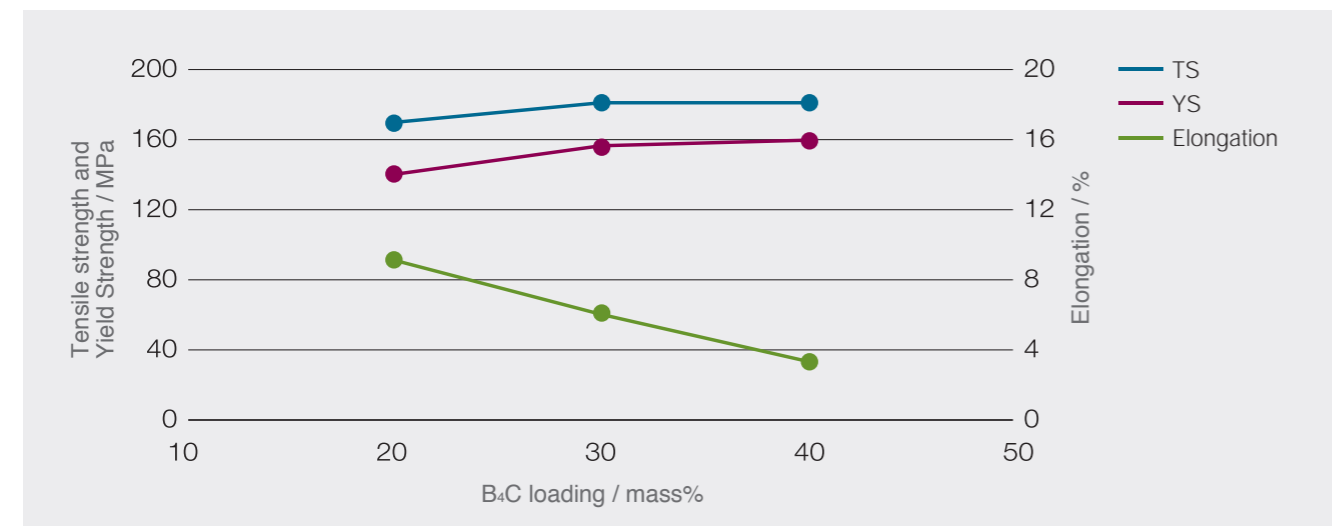


MAXUS<sup>®</sup> is designed and custom-made to answer the needs of all our customers. The high thermal conductivity and high <sup>10</sup>B areal density of MAXUS<sup>®</sup>, combined with a relatively high strength - considering it is a non-structural material - makes it suitable for a wide range of applications, from low burn-up to high burn-up designs.

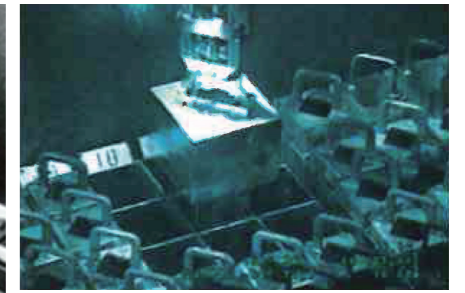
### MAXUS<sup>®</sup> Main Characteristics

Maximum Length	5,000 mm (197 inch)
Maximum Width	500 mm (20 inch)
Thickness	From 2 to 10 mm (0.075 to 0.395 inch)
Clad material	5000 Series Aluminium Alloy
Matrix material	1070 Aluminium
B <sub>4</sub> C content in the matrix	From 20 to 40 mass %
Density	2.6 g/cm <sup>3</sup>
Thermal Conductivity	From 110 to 160 W/m-K (In-Plane, at Room Temperature)

### Tensile Strength, Yield Strength and Elongation

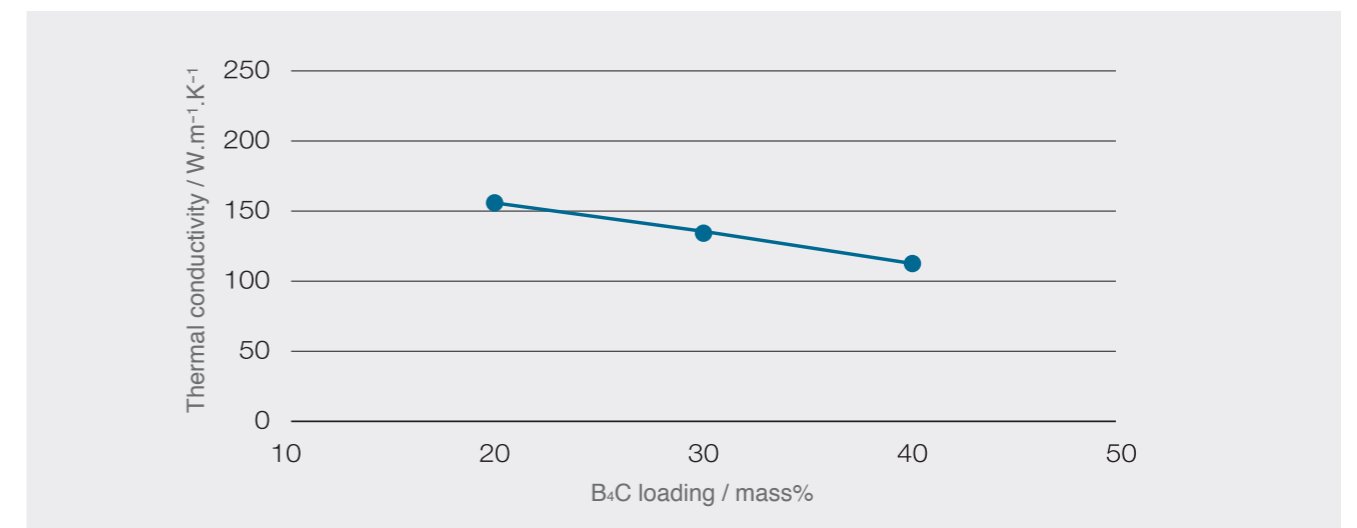


MAXUS<sup>®</sup> for use in spent fuel pool racks

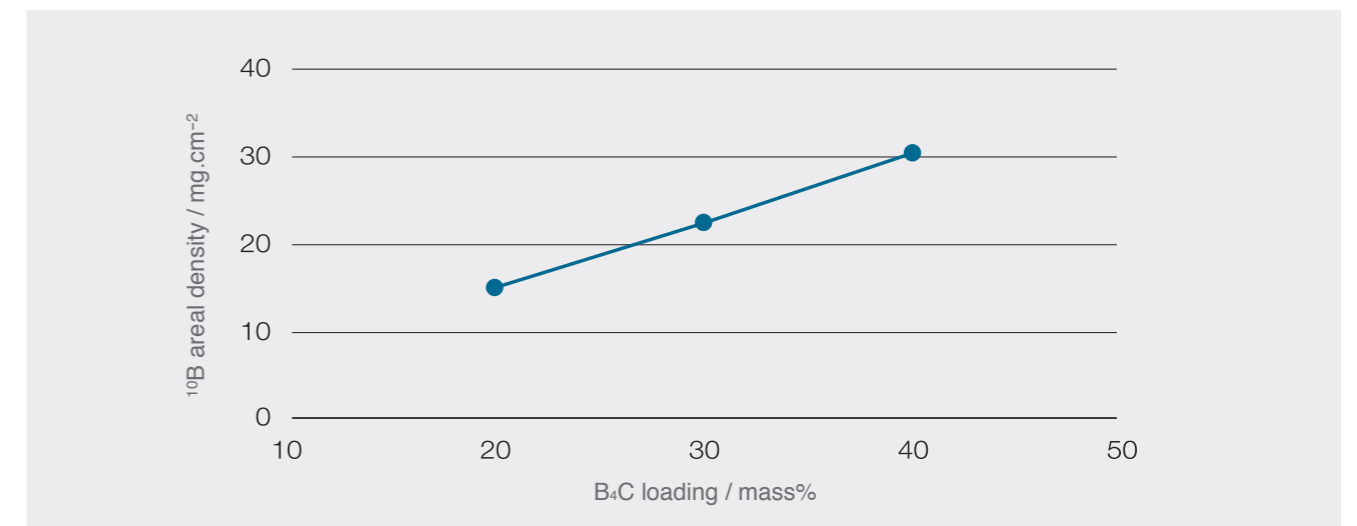


Photos: NETCO, a business unit of Curtiss-Wright Corporation

### Thermal Conductivity (In-Plane, at Room Temperature)



### <sup>10</sup>B Areal Density (per 2.5 mm thickness)



MAXUS® is entirely manufactured in-house, from the upstream processes (powdering, casing) to the downstream processes (rolling, cutting and inspection), allowing for strict quality control throughout all the process. MAXUS® QA Program is compliant to 10 CFR 21, 10 CFR 71 Subpart H, 10 CFR 72 Subpart G, 10 CFR 830 Subpart A and 10 CFR 50 Appendix B.

### Manufacturing Process of MAXUS® [Summary]

