

Case Study: MoCu Heat sinks Help Cut Weight and Improve Mobility

Weight reduction is a key issue in aerospace/aircraft applications. One should never neglect any possible opportunity to reduce weight. Accumulation of the weight reduction of every individual component may lead to a down-sized engine or smaller wings. A rule of thumb in aerospace field is that one pound directly saved weight can lead to another pound reduction indirectly. The smaller the take-off weight, the smaller the amount of fuel needed, which brings a lot of economical and ecological benefits. In military applications like submarines where mobility is a big concern, weight cut is also crucial.

A big weight reduction potential lies in utilizing lighter heat sinks in electronic devices used in aerospace/aircraft applications and submarines. MoCu heat sinks provided by Torrey Hills Technologies have been applied in the International Space Station (ISS), F-15 Eagle fighters and submarines to provide the solutions.



Fig 1. International Space Station (ISS)



Fig 2. F-15 Eagle



Fig 3. A submarine

Challenge

How to reduce the weight of heat sinks in electronic devices while meeting other performance requirements like CTE (coefficient of thermal expansion) and TC (thermal conductivity) has been a challenge in aerospace and military application fields.

Solutions: MoCu thermal management materials

The MoCu composite exhibits combinational properties such as high electrical and thermal conductivities, low CTE, nonmagnetic, good high-temperature performance and etc.

Compared with traditional packaging materials, they have a high thermal conductivity and their CTEs can be tailored by adjusting the Mo/Cu ratio to closely match those of die materials.

Compared with WCu materials which also enjoy high thermal conductivity and are CTE changeable, MoCu materials have a lower density. Typical properties of heat sink grade WCu and MoCu materials are shown respectively in table 1 and table 2.

Table 1 Typical properties of heat sink grade WCu

Name	Density(g/cm ³)	CTE(10 ⁻⁶ K ⁻¹)	TC(W/mK)
W90Cu	17.0	6.5	190-200
W88Cu	16.9	6.8	190-200
W85Cu	16.3	7.0	200-210
W80Cu	15.6	8.0	210-220

Table 2 Typical properties of heat sink grade MoCu

Name	Density(g/cm ³)	CTE(10 ⁻⁶ K ⁻¹)	TC(W/mK)
Mo85Cu	10.0	6.8	165
Mo80Cu	9.9	7.2	175
Mo70Cu	9.7	7.5	195
Mo60Cu	9.6	9.5	215
Mo50Cu	9.5	9.9	250

For more information, please check <http://www.torreyhillstech.com/hsmocu.html>