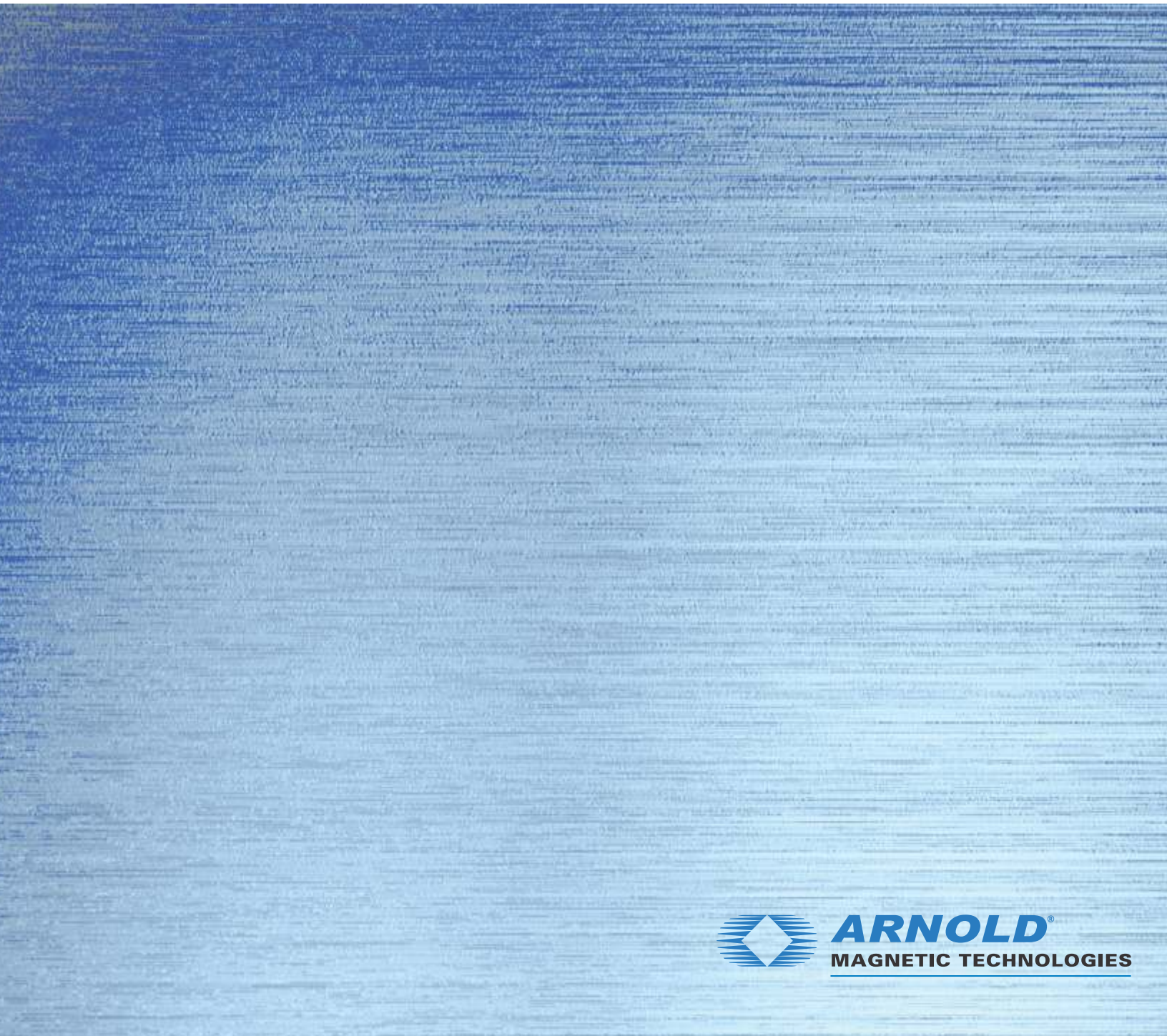
Thin Molypermalloy Applications
for Electromagnetic Shielding

Arnold Magnetic Technologies – Precision Thin Metals Division can roll Molypermalloy as thin as 0.00008” (0.002 mm). Thin Molypermalloy can be used in a variety of applications, but its high magnetic permeability makes it well suited for electromagnetic shielding.



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Arnold's Thin Molypermalloy

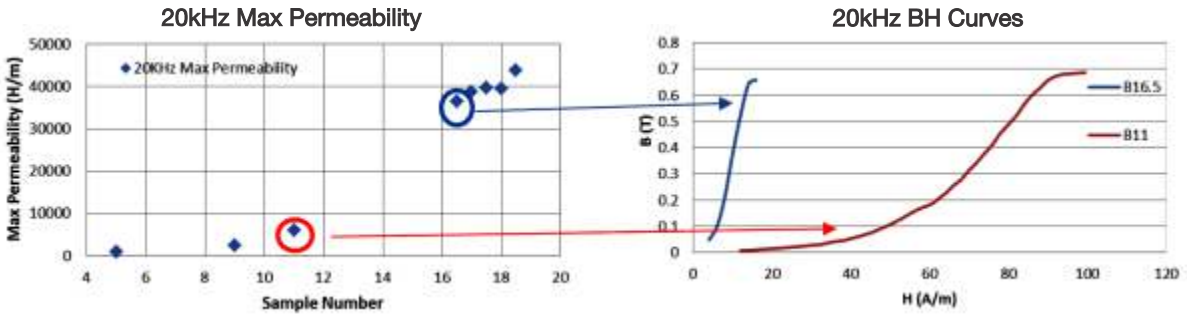
Arnold Magnetic Technologies starts with Soft Nickel Iron processed under carefully controlled conditions at one of several DFARS compliant US based plants. Arnold is able to roll the metal down to ultra thin gauges:

Thickness	Maximum Width
0.01" - 0.00031" (0.254 - 0.00787mm)	14.5" (368.3mm) as-rolled edge 14.0" (355.6mm) with a slit edge
0.00030" - 0.00008" (0.00762 - 0.0020mm)	4.25" (107.95mm) as-rolled edge 4.00" (101.60mm) with a slit

Characterized by its relatively high permeability and low core losses, nickel-iron alloys and soft magnetic materials are used for efficient energy storage, transfer and shielding. Thin-rolled nickel-iron alloys from Arnold's PTM Division provide high saturation flux density making these materials optimally suited for high performance energy storage and transfer over low to medium frequencies.

Material Customization:

The PTM division is able to change Molypermalloy's properties by changing the final heat treatment process. The charts below show an example where the goal was to maximize permeability at 20kHz. PTM was able to significantly increase permeability at the target frequency by changing the heat treatment conditions.



Max Permeability of Molypermalloy Samples

BH Curve of Molypermalloy Samples

Figure 1: Molypermalloy Heat Treatment Testing

Testing:

PTM is also able to test magnetic properties in the MHz range using a Stripline Cavity tester. The results from these tests help determine how the Molypermalloy would respond in high frequency applications, shielding or transmission applications.

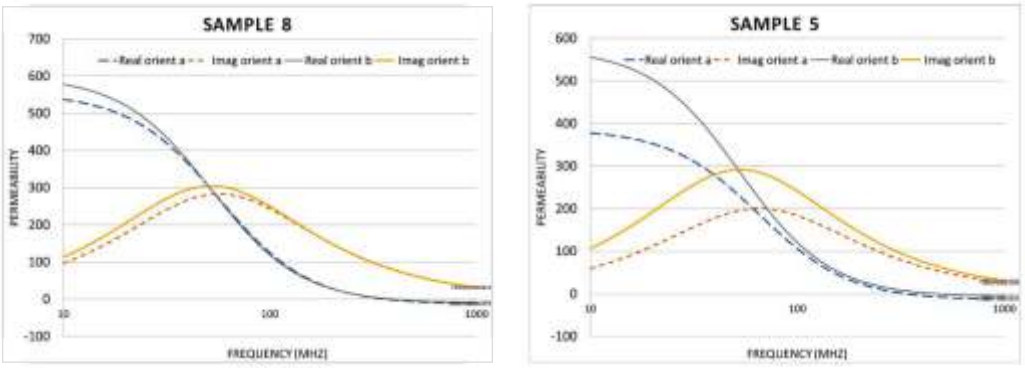
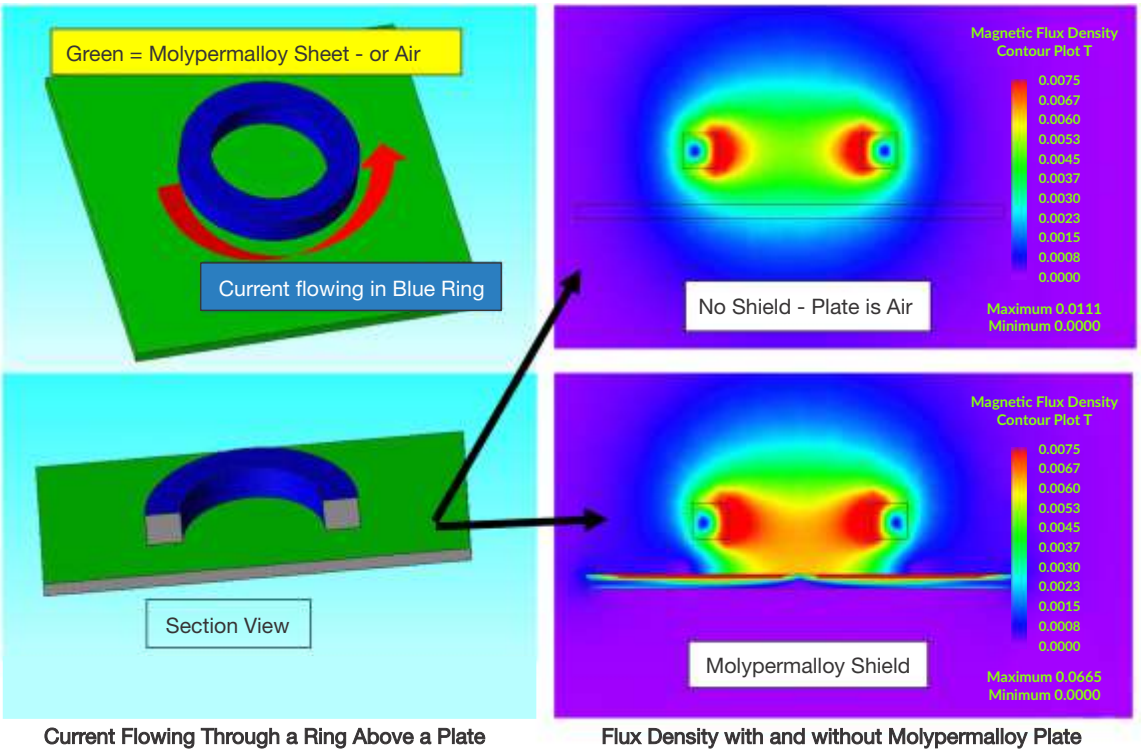


Figure 2: Molypermalloy Stripline Cavity Test Results

Design Assistance:

In addition to material testing and validation, Arnold Magnetic Technologies also has a Technology Center that can assist with electromagnetic modeling. This modeling can help determine the minimum shield thickness, or help test alternate shielding geometries. The images in Figure 3 show a simple coil with and without a Molypermalloy shield:



Current Flowing Through a Ring Above a Plate

Flux Density with and without Molypermalloy Plate

Figure 3: Flux Density around a coil with and without a Molypermalloy Plate.

Materials & Composition:

	Ni	Mo	Mn	Si	Fe	C	V	Nb	Co	Cr	Al	Ti
Moly Permalloy	80.0	4.8	0.5	0.35	Bal.	—	—	—	—	—	—	—
Supermendur	—	—	—	—	49.0	—	2.0	—	49.0	—	—	—
Permendur	—	—	—	—	49.0	—	2.0	—	49.0	—	—	—
Alloy 43	42.5	—	0.5	0.5	Bal.	0.03	—	—	—	5.25	0.5	2.5
Alloy 48	48.0	—	0.8	0.3	Bal.[1]	0.05	—	—	—	0.25	0.1	—
Alloy 49	48.0	—	0.5	0.35	51.0	0.02	—	—	—	—	—	—
A753 Alloy 4	79.0 - 80.6	3.8 - 5.0	0.95	0.42	Bal.[2]	0.03	—	—	—	—	—	—

[1] P 0.025 max; S 0.025 max [2] P 0.02max; S 0.008 max

Phosphorus & Sulfur contents are noted on these grades due to their detrimental effect to the material performance if they exceed the maximums.

About Arnold Magnetic Technologies

Arnold Magnetic Technologies manufactures materials and assemblies which enable the efficient electrification of machines. The Precision Thin Metals (PTM) division produces a variety of thin gauge metal products. Thin electrical steels can improve motor and transformer efficiency. Thin titanium can be used to reduce weight in structural applications, and thin nickels can be used in magnetic shielding applications. Arnold's materials, engineered components and systems are proven in the most demanding aerospace, motorsport, energy exploration, industrial, and medical device applications.

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Learn more about Arnold's performance materials at **arnoldmagnetics.com.**