

CINDAS線上資料庫

航太及高性能合金資料庫 (Aerospace and High Performance Alloys Database, AHAD)

AHAD是一個線上組合資料庫，涵蓋了CINDAS兩個廣受歡迎的產品：航太結構金屬資料庫 (ASMD) 和高性能合金資料庫 (HPAD)。AHAD擁有345種合金的詳細資訊：提供21,434多頁、圖文並存的PDF綜合文獻，引用12,441多個參考資料，包含29,979多個資料組，以及近105,641條資料曲線。AHAD的檢索介面友好易用，能幫助用戶快速地選擇和比較特定金屬合金的屬性。

AHAD用戶和應用領域

大專院校	課程輔助教材
技術類學校	專案參考&指南
政府機構	新材料研究
航太工業	汽輪機設計
汽車工業	研發發動機&車架
工業供應商	製造/機械
研究類公司	研究&開發
等等	

關於AHAD資料庫

AHAD資料庫涵蓋了ASMD和HPAD的所有資料。將兩個廣受歡迎的獨立資料庫合併成一個綜合資料庫，可以極大地提高檢索資料的效率。使用者只需在AHAD的綜合資料庫中進行搜索，就能同時查到ASMD和HPAD兩個獨立資料庫中的全部所需資料。

檢索和流覽AHAD資料庫

材料類別

(鋁，鈦，鎳合金，不銹鋼，等等)

材料名稱

(Al-6061, Ti-6Al-4V, Inconel 706, 等等)

屬性類別

(機械，熱物理，等等)

屬性名稱

(降伏強度，伸長率，破壞韌性，腐蝕速率，等等)

屬性類別

AHAD資料庫含有20個屬性類別，830種不同的屬性。使用者可以使用瀏覽的方式，打開屬性類別的下拉式功能表，逐層向下查找所需的屬性。或者，使用者也可以使用檢索的方式，在檢索框中直接輸入屬性名稱的關鍵字，迅速查到所需的屬性。

熱物理

熱輻射

電、磁、核子

機械屬性

強度、應力、硬度、疲勞和裂紋成長、衝擊能、應變、收縮率、變形及其他

其他屬性

溫度

時間，使用壽命

腐蝕、氧化和重量變化

長度、厚度、直徑、尺寸和晶粒尺寸

成分含量，相位

等等

檢索和瀏覽AHAD資料庫示範

A. 查找資訊

檢索：在檢索框中直接輸入需要查找的材料名稱或者屬性名稱（全名或者部分名稱）

AHAD (version 1.0, data updated 2015.02) [Start Over](#) | [TOC](#) | [PDF](#) | [Help](#)

Browse By:
Material Group:

or
Property Group:

Search By:
Material Name:
* e.g., ni mol, Nickel Molality

or
Property Name:
* e.g., elastic, Elastic Resilivity

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瀏覽：使用下拉式功能表，逐層向下查找所需的材料和屬性。

Select Property Group: Mechanical Properties - Fatigue
(20 property groups)

Select Property Name:

- Alternating Pseudo Stress
- Cycles to First or Initiation Crack, Initiation Life
- Delay Cycles
- Effective Crack Length
- Fatigue, Crack Growth Rate
- Fatigue, Crack Growth Rate, m per cycle
- Fatigue, Cyclic Stress
- Fatigue Life Fraction (N/N₀)
- Fatigue Limit or Endurance Limit
- Fatigue, Maximum Stress
- Fatigue, Mean Stress
- Fatigue Strength
- Fatigue Strength Ratio, Fatigue Strength/F_u
- Fatigue Strength Ratio, Fatigue Strength/F_y
- Fatigue, Stress Amplitude or Alternating Stress
- Fatigue, Stress Range
- Fatigue, Torsional Strength
- Fracture Toughness, Conditional Result K_Q
- Mean Stress
- Peak Pseudo Stress
- Percentage of Fatigue Max. Stress/ Ultimate Strength
- True Fracture Stress

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AHAD資料庫含有26個材料類別、348種金屬合金材料，以及20個屬性類別、830種屬性。

B. 選定資訊

選擇：自變量

AHAD (version 1.0, data updated 2015.02)

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Select Property Group: Mechanical Properties - Fatigue
(20 property groups)

Select Property Name: Fatigue, Stress Amplitude or Alternating Stress
(22 properties)

Property Range
Fatigue, Stress Amplitude or Alternating Stress (ksi) -1.51 - 210.74

Select an Independent Variable, and then click the Show Graph or Show Text button.

Independent Variable	Minimum	Maximum
<input type="radio"/> Cycles (cycles)	0.49	26501460.22
<input type="radio"/> Cycles to Failure or Fatigue Life (cycles)	0.78	598319043.59
<input type="radio"/> Cycles to First or Initiation Crack, Initiation Life (cycles)	8752.35	237886.18
<input type="radio"/> Cyclic Strain (percent)	1.37	7.92
<input type="radio"/> Fatigue, Mean Stress (ksi)	-24.48	193.64
<input type="radio"/> Mean Stress (ksi)	0.0	87.69
<input type="radio"/> Plastic Strain Amplitude (percent)	0.03	1.54
<input type="radio"/> Strain Amplitude (percent)	0.007507574907	2.59
<input type="radio"/> Strain Range in % (percent)	0.6	5.96
<input type="radio"/> Temperature (F)	81.71	936.44
<input type="radio"/> Time to Failure or LCF Life (h)	23.02	3474.03

C. 查看資訊

使用者可以在同一張圖表上比較多種材料的同一種屬性。

步驟一：選擇材料

步驟二：選擇資料曲線/測試條件

注：使用者可以隨時點擊“Show text (顯示文本)”按鈕，查看各個數據點的具體數值、相關資訊的文字說明，以及所引用的參考資料，等等。

Property Group: Mechanical Properties - Fatigue
 Property: Fatigue, Stress Amplitude or Alternating Stress (ksi) Logarithmic
 Independent Variable: Cycles to Failure or Fatigue Life (cycles) Logarithmic

Select Materials ?

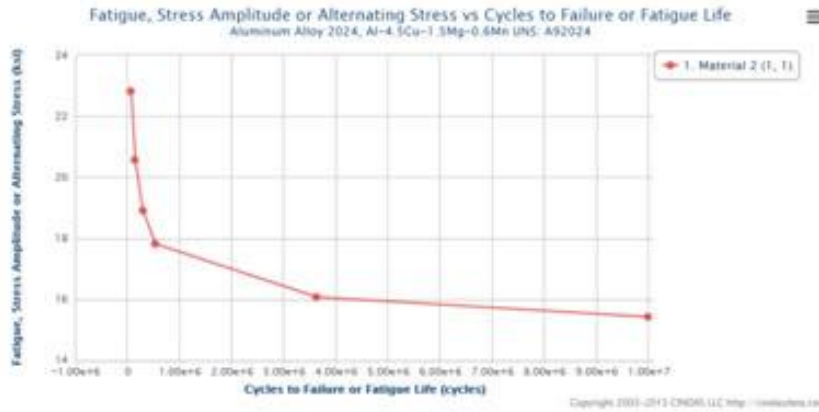
Select one or more materials from the list below. Hold the control key to select multiple materials. Available data curves will be displayed on the right. Then proceed to Step 2.

- M1: Aluminum Alloy 2014, Clad 2014, Al-4.5Cu-1Mn-1Si-0.5Mg UNS: A92014
 - M2: Aluminum Alloy 2024, Al-4.5Cu-1.5Mg-0.6Mn UNS: A92024
 - M3: Aluminum Alloy 2219, Clad 2219, Al-6.3Cu-0.3Mn-0.18Zr-0.10V-0.06Ti UNS: A92219
 - M4: Aluminum Alloy 5052, Al-2.5Mg-0.25Cr UNS: A95052
 - M5: Aluminum Alloy 5059, Al-5.5Mg-0.9Mn-0.7Zn-0.15Cr UNS: A95059
- (Listing 49 materials)

Select Data Curves/Test Conditions ?

Select between one and twenty data curve descriptions from the list below to view graphs. Hold the Control key to select multiple data curves.
 Key: Selected Material (Set, Curve) - Remarks

- 1 M2 (1, 1) - C1: Rf=2.3, T81, smooth curve, mean stress = -5 ksi
- 2 M2 (1, 2) - C2: mean stress = 0 ksi
- 3 M2 (1, 3) - C3: mean stress = 5 ksi
- 4 M2 (1, 4) - C4: mean stress = 10 ksi
- 5 M2 (1, 5) - C5: mean stress = 14 ksi



D · 客製化資訊的顯示形式：圖表和數字

- 近105, 641條資料曲線
- 不同的資料曲線採用不同的顏色和標記繪製、標註
- 同一圖表上可以顯示不同材料、相同屬性的多條資料曲線
- 將游標停留在各個數據點上，會自動顯示相應的X和Y數值
- 可以在X和Y變數的各種常用單位之間快速地進行單位轉換（包括所有常用的英制或國際單位制單位）

Property Group: Mechanical Properties - Fatigue
 Property: Fatigue, Stress Amplitude or Alternating Stress (ksi) Logarithmic
 Independent Variable: Cycles to Failure or Fatigue Life (cycles) Logarithmic

Select Materials ?

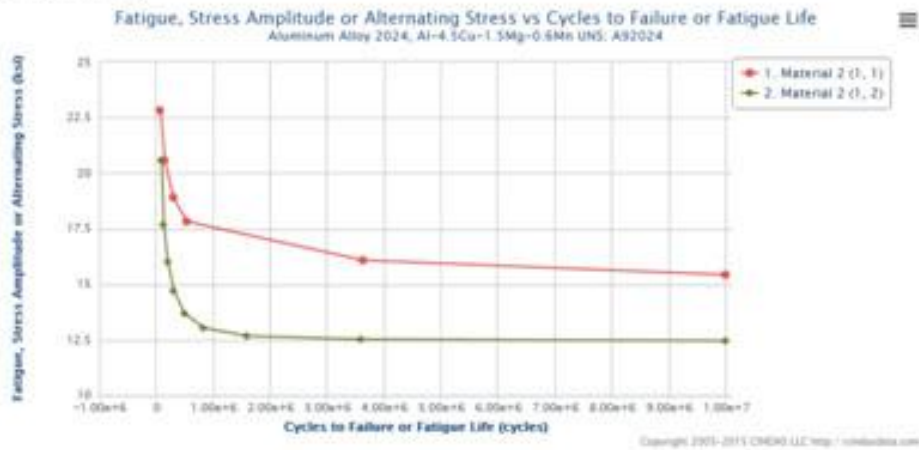
Select one or more materials from the list below. Hold the control key to select multiple materials. Available data curves will be displayed on the right. Then proceed to Step 2.

- M1: Aluminum Alloy 2014, Clad 2014, Al-4.5Cu-1Mn-1Si-0.5Mg UNS: A92014
 - M2: Aluminum Alloy 2024, Al-4.5Cu-1.5Mg-0.6Mn UNS: A92024
 - M3: Aluminum Alloy 2219, Clad 2219, Al-6.3Cu-0.3Mn-0.18Zr-0.10V-0.06Ti UNS: A92219
 - M4: Aluminum Alloy 5052, Al-2.5Mg-0.25Cr UNS: A95052
 - M5: Aluminum Alloy 5059, Al-5.5Mg-0.9Mn-0.7Zn-0.15Cr UNS: A95059
- (Listing 49 materials)

Select Data Curves/Test Conditions ?

Select between one and twenty data curve descriptions from the list below to view graphs. Hold the Control key to select multiple data curves.
 Key: Selected Material (Set, Curve) - Remarks

- 1: M2 (1, 1) - C1 KI = 2.3, T81, smooth curve, mean stress = -5 ksi
- 2: M2 (1, 2) - C2: mean stress = 0 ksi
- 3: M2 (1, 3) - C3: mean stress = 5 ksi
- 4: M2 (1, 4) - C4: mean stress = 10 ksi
- 5: M2 (1, 5) - C5: mean stress = 14 ksi



材料交叉索引

AHAD資料庫的材料交叉索引檔涵蓋了資料庫內所有金屬合金的商用名和別名。材料交叉索引檔可讓使用者在只知道材料的商品名或商用名的情況下，也能迅速查到所需的金屬合金。

MCode	MName	Commercial and Alternate Designations
1201	High Strength Steel 4130	4130, AISI 4130, SAE 4130, 4130H, UNS G41300
1203	High Strength Steel 4140	4140, AISI 4140, SAE 4140, 4140H, UNS G41400
1204	High Strength Steel 4330V	4330V, 4330, 4330 Mod, 4330V Mod, 4330V (Mod)
1206	High Strength Steel 4340	4340, AISI 4340, SAE 4340, E 4340, 4340 H, UNS
1208	High Strength Steel 8630	8630, AISI 8630, SAE 8630, 8630H, UNS J15042
1218	High Strength Steel H-11 Mod	H-11 Mod, AISI Type H-11, SAE Type H-11, UNS
1226	High Strength Steel 18Ni (300) Maraging	18Ni Maraging Steel, 18Ni-Co-Mo, 18-9-5, Vascor
1228	High Strength Steel Maraging T-250	Maraging T-250, Maraging MS 250, Maraging Free
1230	High Strength Steel H-13	Grade CH-13, GX40C/MoV5-1, X40C/MoV5, ESR I
1301	Stainless Steel Types 301 and 302	Type 301, SAE 30301, UNS 30100
1306	Stainless Steel Types 316 and 316L	Type 316 (UNS S31600), 316L (UNS S31603), CK
1307	Stainless Steels Types 316 and 317	Type 316, 316L, 317, 317L, CF3M, CF8M
1308	Stainless Steel Type 321	Type 321, 321H (11), UNS J82630, S32100, S3210
1311	Stainless Steel 19-9DL	19-9DL, AISI 651, UNS J82643, K83198, K83199
1312	Stainless Steel Type 201	Type 201, AISI 201, UNS S20100, SAE 30201
1314	Stainless Steel 21-6-9	21-6-9, Nitronic 40, ASTM XM-11, UNS S21004, AI
1330	Stainless Steel 15-19-6, BCF 260, Datalloy 2	Carpenter 15-19-6, Carpenter BCF 260 Alloy, ATI

AHAD資料庫還提供了互動式的、線上版的印刷手冊。PDF線上手冊中包含了各種金屬合金的大量補充資訊，極大地豐富了AHAD資料庫的內容。

PDF線上手冊內容：

- 概況
- 商用名
- 別名
- 金屬規格
- 成分
- 熱處理
- 類型和條件
- 熔化和鑄造
- 加工
- 金屬處理
- 等等



Author: J. C. Benedyk

Composition limits of H-13 based on the AISI/UNS (T20813) standards are (mass %): 0.32-0.45 C, 0.20-0.50 Mn, 0.80-1.20 Si, 4.75-5.50 Cr, 0.30 max Ni, 1.10-1.75 Mo, 0.80-1.20 V, 0.250 max Cu, 0.03 max P, and 0.03 max S. Where specified, as resulfurized H-13, sulfur may be increased to 0.06-0.15% to improve machinability.

Besides the standard H-13 grade, various modified, premium, and superior grades of H-13 are available from hot work steel producers, usually with limiting phosphorus and/or sulfur levels that are below the standard composition limits to improve toughness and thermal fatigue resistance and containing principle alloying elements in particular ranges that may be outside the T20813 standard. Also, the premium grades of H-13 within T20813 composition limits are generally produced by special refining and metallurgical practices to control microstructure and especially carbide size and distribution.

1.0 General

This medium alloy, martensitic, air hardening, ultrahigh-strength steel is similar to H-11 and H-11 Mod in composition, heat treatment, and many properties. The steels H-11, H-11 Mod, and H-13 exhibit several properties that are important in airframe and landing gear applications, including the ability to be heat treated to an ultimate tensile strength of 300 ksi while having excellent thermal shock resistance. These grades are typically hardened by austenitizing and cooling in air, flowing inert gas, oil, or hot salt bath. Upon

H-13, which leads to a greater dispersion of vanadium carbides and higher wear resistance. The H-13 steel also has a slightly wider range of the other principal alloying elements, allowing producers flexibility in tailoring mechanical properties for given heat treatments and applications. Premium and superior grades of H-13 have carefully controlled compositions with low levels of sulfur and phosphorus and are produced by special melting, refining, and hot forging/rolling schedules primarily to achieve a fine microstructure and improve toughness and thermal fatigue resistance over conventionally produced H-13 grades. In a few cases, some H-13 producers employ long term, high temperature, homogenization techniques with controlled cooling to refine the carbide distribution and produce a more isotropic microstructure. Powder/particle metallurgy grades of H-13 are available with significantly refined distributions of carbides and sulfides (for the high sulfur, free machining grade) to improve toughness and thermal fatigue and wear resistance relative to conventional H-13 steel that is normally produced by ingot metallurgy. Careful consideration of H-13 supply will assure a cost effective selection of steel grade for a given application.

	Fe
5.0	Cr
1.5	Mo
1.0	V
0.35	C

對於 AHAD 資料庫, 我們充滿信心

AHAD 資料庫的檢索快捷、高效，內容不斷更新。目前，越來越多的企業、大學和研究機構正在使用 AHAD 資料庫。

- ◆ 本資料庫在台灣由智泉國際事業有限公司(VI Services Ltd. iGroup Taiwan)代理。