

## CINDAS网络数据库

### 宇航及高性能合金数据库 (Aerospace and High Performance Alloys Database, AHAD)

AHAD是一个网络组合数据库, 涵盖了CINDAS两个广受欢迎的产品: 宇航结构金属数据库 (ASMD) 和高性能合金数据库 (HPAD)。AHAD拥有345种合金的详细信息: 提供21,476多页、图文并茂的PDF综合文献, 引用12,311多个参考资料, 包含29,546多个数据组, 以及近104,307条数据曲线。AHAD的检索界面友好易用, 能帮助用户快速地选择和比较特定金属合金的属性。

### AHAD用户和应用领域

大专院校	课程辅助教材
技术类学校	项目参考&指南
政府机构	新材料研究
宇航工业	汽轮机设计
汽车工业	研发发动机&车架
工业供应商	制造/机械
研究类公司	研究&开发
等等 .....	

### 关于AHAD数据库

AHAD数据库涵盖了ASMD和HPAD的所有数据。将两个广受欢迎的独立数据库合并成一个综合数据库, 可以极大地提高检索数据的效率。用户只需在AHAD的综合数据库中进行搜索, 就能同时查到ASMD和HPAD两个独立数据库中的全部所需资料。

### 检索和浏览AHAD数据库

#### 材料类别

(铝, 钛, 镍合金, 不锈钢, 等等)

#### 材料名称

(Al-6061, Ti-6Al-4V, Inconel 706, 等等)

#### 属性类别

(机械, 热物理, 等等)

#### 属性名称

(屈服强度, 伸长率, 断裂韧性, 腐蚀速率, 等等)

## 属性类别

AHAD数据库含有20个属性类别，799种不同的属性。用户可以使用浏览的方式，打开属性类别的下拉菜单，逐级向下查找所需的属性。或者，用户也可以使用检索的方式，在检索框中直接输入属性名称的关键字，迅速查到所需的属性。

热物理

热辐射

电、磁、核子

机械属性

强度，应力，硬度，疲劳&裂纹扩展，冲击力，应变，收缩率，变形及其他

其他属性

温度

时间，使用寿命

腐蚀、氧化和重量变化

长度、厚度、直径、尺寸和晶粒尺寸

成分含量，相位

等等 .....

## 检索和浏览AHAD数据库示范

### A. 查找信息

**检索：**在检索框中直接输入需要查找的材料名称或者属性名称（全名或者部分名称）

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 mos, Niocr mosby

or Property Name    
\*e.g., electro, Electro Reactivity

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**浏览：**使用下拉菜单，逐级向下查找所需的材料和属性。

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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 (Nhi/NiC)
- Fatigue Limit or Endurance Limit
- Fatigue, Maximum Stress
- Fatigue, Mean Stress
- Fatigue Strength
- Fatigue Strength Ratio, Fatigue Strength/Fu
- Fatigue Strength Ratio, Fatigue Strength/Fy
- Fatigue, Stress Amplitude or Alternating Stress
- Fatigue, Stress Range
- Fatigue, Torsional Strength
- Fracture Toughness, Conditional Result Kq
- Mean Stress
- Peak Pseudo Stress
- Percentage of Fatigue Max. Stress/ Ultimate Strength True Fracture Stress

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AHAD数据库含有26个材料类别、345种金属合金材料，以及20个属性类别、799种属性。

## B. 选定信息

选择：自变量

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Select Property Group:  (20 property groups)

Select Property Name:  (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	237896.18
<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)	0.007507674907	2.59
<input type="radio"/> Strain Range in % (percent)	0.6	5.96
<input type="radio"/> Temperature (F)	61.71	936.44
<input type="radio"/> Time to Failure or LCF Life (h)	23.02	3474.03

## C. 查看信息

用户可以在同一张图表上比较多种材料的同一种属性。

步骤一： 选择材料

步骤二： 选择数据曲线/测试条件

注：用户可以随时点击“Show text (显示文本)”按钮，查看各个数据点的具体数值、相关信息的文字说明，以及所引用的参考资料，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 ?

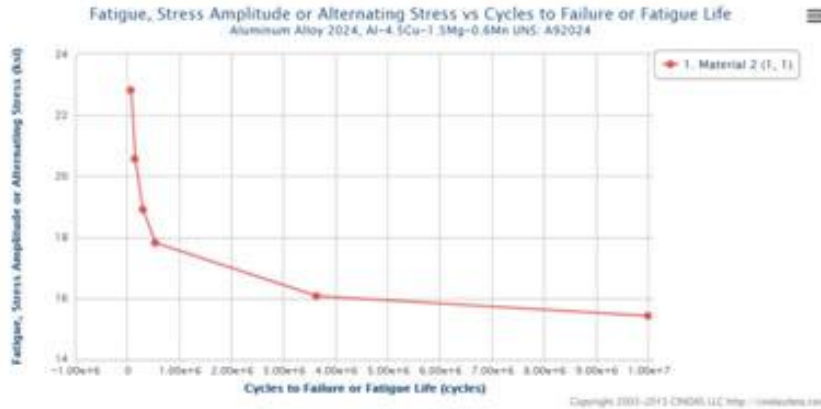
Select one or more materials from the list below. Hold the control key to select multiple materials. Available data curves will be displayed on the right. Then proceed to Step 2.

- 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: K1=2.3, 181, 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. 定制信息的显示形式：图表和数字

- 近104, 307条数据曲线
- 不同的数据曲线采用不同的颜色和标记绘制、标注
- 同一图表上可以显示不同材料、相同属性的多条数据曲线
- 将光标悬停在各个数据点上，会自动显示相应的X和Y数值
- 可以在X和Y变量的各种常用单位之间快速地进行单位转换（包括所有常用的英制或国际单位制单位）

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-1.5Mn-0.6Mg UNS: A92024
  - M3: Aluminum Alloy 2219, Clad 2219, Al-6.3Cu-0.3Mn-0.15Zr-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数据库的材料交叉索引文件涵盖了数据库内所有金属合金的商用名和别名。材料交叉索引文件可以帮助用户在只知道材料的商品名或商用名的情况下，也能迅速查到所需的金属合金。

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 J13042
1218	High Strength Steel H-11 Mod	H-11 Mod, AISI Type H-11, SAE Type H-11, UNS*
1225	High Strength Steel 18Ni (300) Maraging	18Ni Maraging Steel, 18Ni-Co-Mo, 18-Ni-5, Vascom
1228	High Strength Steel Maraging T-250	Maraging T-250, Maraging MS 250, Maraging Free
1230	High Strength Steel H-13	Grade CH-13, GX400MnV5-1, X400MnV5, ESR I
1301	Stainless Steel Types 301 and 302	Type 301, SAE 30301, UNS 30100
1305	Stainless Steel Types 316, 316L	Type 316 (UNS S31600), 316L (UNS S31606), 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 J42630, S32100, S3210
1311	Stainless Steel 18-8DL	18-8DL, AISI 651, UNS J42843, K83198, P63198
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 S21904, AT
1330	Stainless Steel 15-15-5, SCF 260, Datalloy 2	Carpenter 15-15H, Carpenter SCF 260 Alloy, AT11

**PDF在线手册**

AHAD数据库还提供了互动式的、在线版的印刷手册。PDF在线手册中包含了各种金属合金的大量补充信息，极大地丰富了AHAD数据库的内容。

**PDF在线手册内容:**

- 概况
- 商用名

别名  
 金属规格  
 成分  
 热处理  
 类型&条件  
 熔化&铸造  
 加工  
 金属处理  
 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

## 对于 AHAD 数据库, 我们充满信心

AHAD 数据库的检索快捷、高效, 内容不断更新。目前, 越来越多的企业、大学和研究机构正在使用 AHAD 数据库。

◆ 本数据库在国内由 iGroup 亚太资讯集团公司代理。