



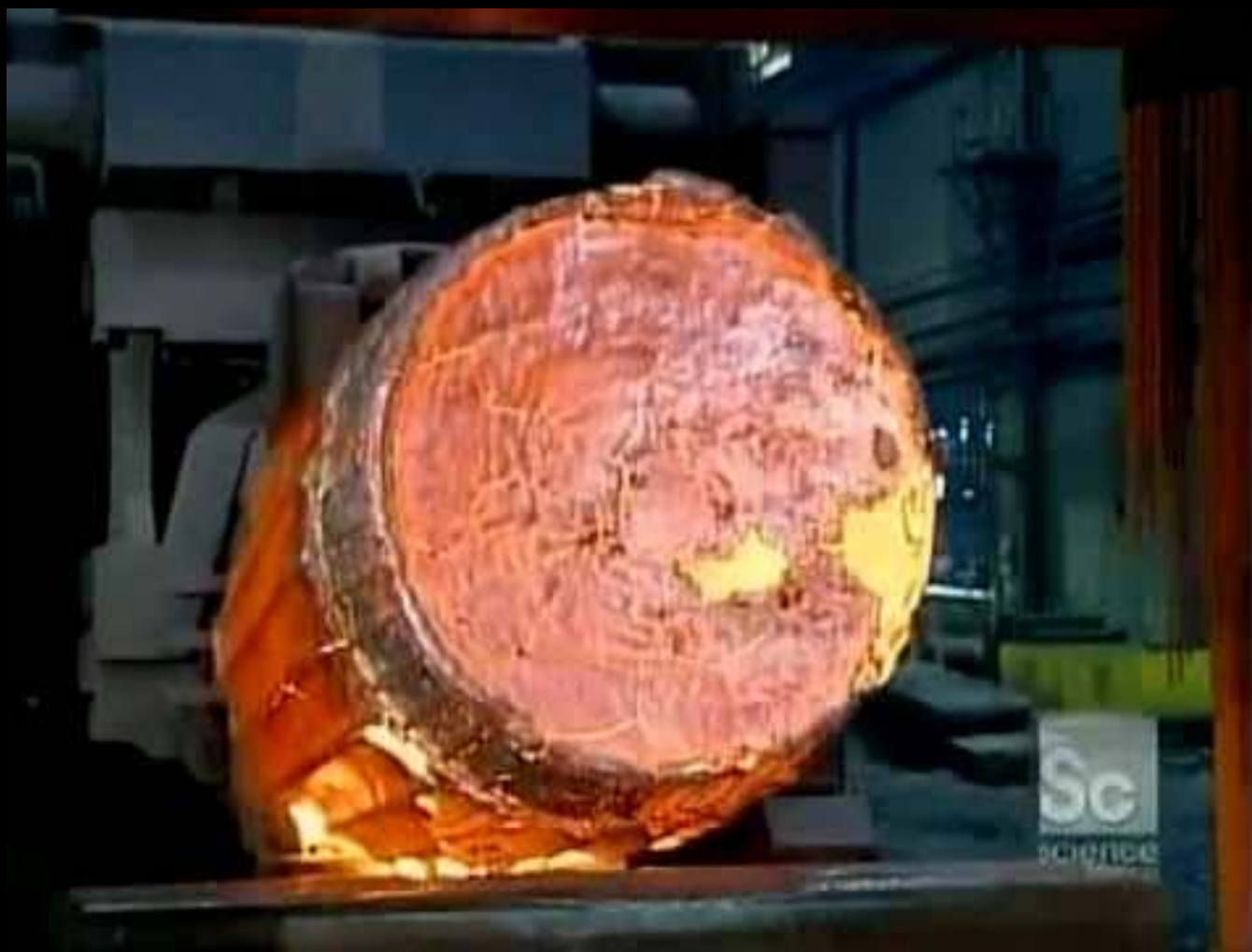
Forging Aluminum for Aerospace Pressure Vessels

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Jorgensen Forge

- Manufactures high-quality forgings from material grades
 - Low alloy steels
 - Aluminum alloys
 - Titanium alloys
 - Nickel base alloys.
- Customers include: US Navy, United Launch Alliance (ULA), and SpaceX





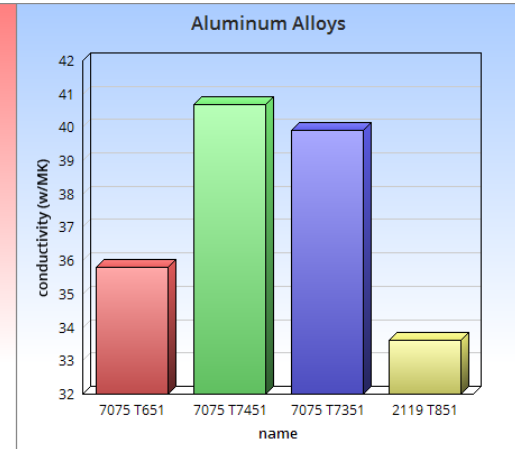
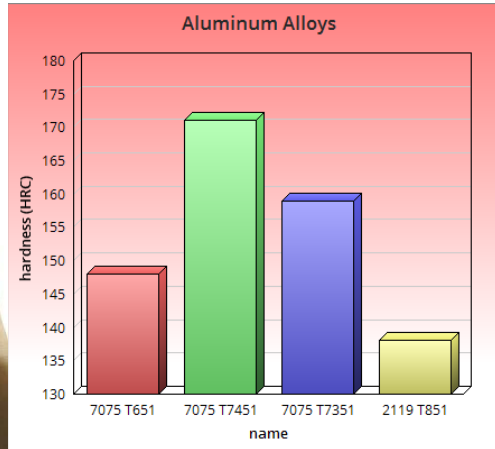
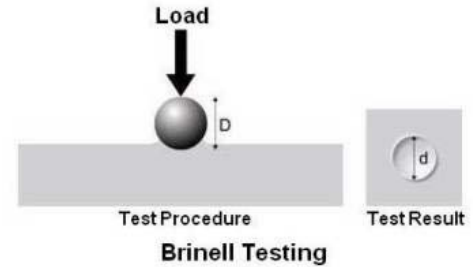
Our Project

- Determine which alloy of aluminum would be best for use in a rocket
 - Why use Aluminum?
 - Strain/Work Hardening
 - Precipitation Hardening
 - Grain Refinement



Determining an Alloy for Rocket

- Conductivity
- Hardness



Aluminum Alloys



- 1000 series is pure aluminium
- 2000 series is alloyed with copper
- 3000 series is alloyed with manganese
- 4000 series is alloyed with silicon
- 5000 series is alloyed with magnesium
- 6000 series is alloyed with magnesium and silicon
- 7000 series is alloyed with zinc
- 8000 series covers any other mixture not covered by the previous series

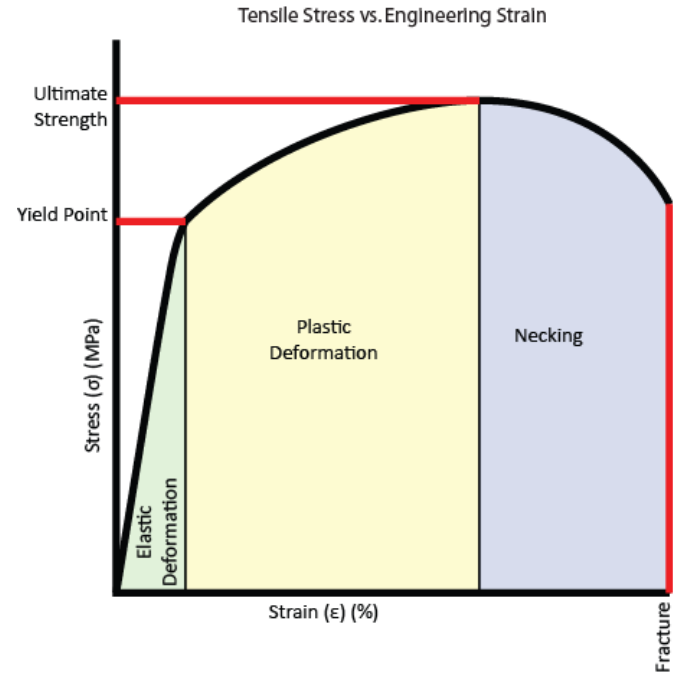
Aluminum Rolled Ring Forgings		Parameters for determining Unknown Samples		
Alloy	Condition	Conductivity Range [% IACS]		Brinell Hardness [HBW] {per MIL-A-22771C Table 6 and other AMS specifications}
		Min	Max	Minimum
2014	T6	32	35	125
2219	T6	32	35	100
2219	T8xx	31	35	115
6061	T6xxx	40	51	80
7049	T73xx	40	44	135
7050	T74xx	38	44	135
7075	T6xxx	30	35	135
7075	T73xx	38	42.5	130
7175	T74xx	38	42.5	135
Determining Alloy from Material Properties			Revealing of Unknown Test Samples	
Sample ID	Measured Conductivity	Measured Hardness	Actual Alloy	Required Specification
1	35.8	148	7075 T651	AMS A22771C
2	40.7	171	7050 T7451	AMS 4108F
3	39.9	159	7075 T7351	AMS 4311E
4	33.6	138	2219 T851	AMS 4144F

Data and Reference Chart

Our choice is:

7050 T7451

- strongest/ hardest alloy
- Higher ultimate tensile strength
- durable
- suitable for aerospace pressure





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Thank You!

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