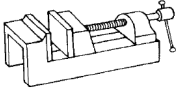



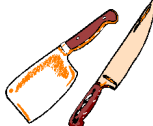


Design & Manufacture

Homework 19

FERROUS METALS

NAME	COMPOSITION	PROPERTIES	USES
Cast Iron	Iron + 3.5% carbon	Smooth skin with soft core, strong when compressed, self lubricating, cannot be bent or forged.	Vices, lathe beds, garden bench ends, car brake drums, etc 
Mild Steel	Iron + 0.15 - 0.35% carbon	Ductile, malleable & tough, high tensile strength, poor resistance to corrosion, easily welded.	Car bodies, washing machine bodies, nuts & bolts, screws, nails, girders, etc. 
High Carbon Steel (tool steel)	Iron + 0.8 - 1.5% carbon	Very hard, rather brittle, difficult to cut, poor re- sistance to corrosion.	Tool blades e.g. saws, chisels, screwdrivers, punches, knives, files, etc. 
High Speed Steel	Iron + tungsten chromium vanadium	Very hard, heat resistant, remains hard when red	Drills, lathe cutting tools, milling cutters, power hacksaw blades etc. 
Stainless Steel	Iron + chromium nickel magnesium	Tough and hard, corrosion resistant, wears well, diffi- cult to cut, bend and file.	Cutlery, sinks, teapots, dishes, saucepans, etc. 

1. What are the differences between mild steel and tool steel?

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2. What is the main advantage of using stainless steel instead of mild steel?



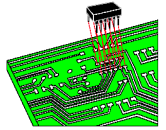
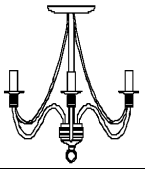
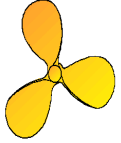



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NON-FERROUS METALS

NAME	COMPOSITION	PROPERTIES	USES
Aluminium	pure metal	Good strength/weight ratio, malleable and ductile, difficult to weld, non-toxic, resists corrosion. Conducts heat and electricity well. Polishes well.	Kitchen foil, saucepans, drinks cans, etc. 
Duralumin	aluminium + manganese + magnesium	Stronger than pure aluminium, nearly as strong as mild steel but only one third the weight.	Greenhouses, window frames, aircraft bodies, etc. 
Copper	pure metal	Tough, ductile and malleable. Conducts heat and electricity well. Corrosion resistant, solders well. Polishes well.	Electrical wire, central heating pipes, circuit boards, saucepan bases 
Brass	Copper + zinc	Quite hard, rigid, solders easily. Good conductor of heat and electricity. Polishes well.	Water taps, lamps, boat fittings, Ornaments, door knockers. 
Bronze	Copper + tin	Tough, strong, wears very well, good corrosion resistance.	Coins, wheel bearings statues boat fittings 
Tin	pure metal	Weak and soft, malleable and ductile, excellent corrosion resistance, low melting point.	Solder (with lead) Coating over mild steel (tin can) 
Lead	Pure metal	Soft, malleable, very heavy, corrosion resistant, low melting point, casts well, conducts electricity well.	Roof covering, Solder (with tin) Car battery plates 
Zinc	pure metal	Poor strength/weight ratio, weak, ductile and malleable, low melting point. Casts well.	Coating over mild steel (galvanising) Die castings used in cars e.g. Carburettor 

1. Why is duralumin used in aircraft?

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2. What property of copper makes it suitable for saucepan bases?

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3. Why is copper used for water pipes but not the taps on the end of the pipes?

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4. Which properties of bronze makes it suitable for making into coins?

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5. Why do you not get everyday objects made from solid tin?

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