

1 :: How many years did it take for you to complete school?

Express your details like this.

I did it in 4 years for undergraduate (summers included) and 2 more for Masters Degree, part time.

2 :: What was the hardest class in Engineering you had to take?

Engineering Circuit Analysis. I don't do well with that stuff.

3 :: Did you have a favorite project that you had to do while in school?

I worked on a ground coupled heat pump project that I really liked. Very interesting stuff, and environmentally worth it.

4 :: Where do you work in Engineering company?

Presently, I work for an Engineering company designing a solar-sourced power plant. I am building a computer model of it. Pretty neat, huh?

5 :: What are some of the projects you are currently working on in Engineering?

Besides the computer model, I have been working on some pump selection/purchases, and some system designs.

6 :: Is there a high demand for mechanical engineers right now?

I would say that there is, because the economy is up and companies are spending more money.

7 :: How many mechanical engineers work with you at your place of employment?

There must be about 20 or so? Not sure.

8 :: What are your specific job requirements in mechanical engineers?

Not sure I understand your question. I need skills in Thermodynamics, and computer modeling, as well as some heat transfer and fluid dynamics. I am pretty broad skilled.

9 :: What is the average salary rate in mechanical engineering job?

Depending on where in the country you work, I earn around \$80,000 permanent employment, or \$100,000 contract.

10 :: Does the rate increase by experience or number of years worked?

absolutely Yes to both.

11 :: Do you receive good benefits as an engineer job?

Depending on the company, Yes. Being an engineer is a good choice. If it is money you want, be a MD. That pays more.

12 :: What was the hardest part of obtaining your engineering degree?

Finishing my Masters degree. I did it later in life, and shouldn't have waited. Advanced math was difficult for me, as was, as I said, anything electrical. (Now I work for electric utilities in power plants. ... Go Figure! lol

13 :: Do you work for many hours each day?

Usually 8 hour days, but lately I have been working 10 hour days.

14 :: What school did you attend in engineering?

I attended the University of _____. A small school, Good education, low cost. Not any scenery to distract you either.

15 :: When did you decide to become and mechanical engineer and why?

Good question. I decided to become a Mechanical Engineer during my first semester. It just seemed to fit the things I enjoyed.

16 :: What is the most important thing you have achieved as an engineer?

I wrote some subroutines that are used in a popular software today. Lots of fun, but it didn't pay much.

17 :: What is the most important, or helpful, project that you have contributed to?

I hope this one. The solar-sourced power plant.
Its up to you to show what is your the most important and helpful project...

18 :: What is a feasibility study?

In order to make wise investments in a marketplace experiencing increasing levels of risk, companies are turning to feasibility studies to determine if they should offer new products, services or undertake a new business endeavor. The purpose of a feasibility

study is to determine if a business opportunity is possible, practical, and viable. When faced with a business opportunity, many optimistic people tend to focus on just the positive aspects.

A feasibility study enables a realistic view at both the positive and negative aspects of the opportunity. A feasibility study is an important tool for making the right decisions. A wrong decision often leads to business failure. For example, only 50% of start-ups are still in business after 18 months and only 20% are in business after 5 years.

19 :: Is it possible for something to explode in space like in the movies?

Yes, provided there is an oxygen source. A spaceship with liquid hydrogen and liquid oxygen will blow up quite well in the vacuum of space. Chemical explosives will also explode in space since they function by breaking weakly bonded chemical components; no oxygen is necessary. Nuclear explosions can of course occur in space, too. The United States military in the 60's performed a series of nuke tests in outer space, and found out what EMP can do, when they briefly wiped out Hawaii's electrical grid for a few hours.

20 :: What are the minerals needed to make or build a car?

- * a) Sulfur is used in tire construction
- * b) Aluminum and iron in the car body and engine
- * c) Quartz is used in windshield construction
- * d) Chromium is used for chrome plating
- * e) Copper is used in wiring
- * f) Magnesium may be used in the wheels
- * g) Zinc would be used in rust plating
- * h) Gold may be used in the spark plugs and in electrical connections
- * i) Tin may be used in solder
- * j) Lead will be used in the batteries
- * k) Tungsten may be used in the light bulb filaments

21 :: How do you determine what suction pressure should be in R22 air conditioning compressors suction line?

The type of refrigerant used and sometimes the amount of charge determines the proper suction pressure of any air conditioning or refrigeration system.

22 :: How do motion detectors work?

Motion detectors work to help with construction work.

23 :: If the black box flight recorder is never damaged during a plane crash, why not the whole airplane made out of that stuff?

The SR-71 was made mostly out of Titanium (very high strength to weight ratio) and it got off the ground fine. In addition, a two-seat airplane cost \$33 million in 1960s dollars, so no one would ever be able to afford an airliner made out of it.

24 :: How do you repair a hydraulic jack?

In general, it seems simple: polishing scored cylinders and pistons, replacing worn seals, replacing excessively worn or damaged parts, etc. However, for an ordinary person, the problem I have run into is finding a readily accessible source of parts, as the hydraulic repair industry seems to be a closed fraternity.

25 :: Does the position of a chicken egg affect the amount of weight it can withstand?

Yes. Lying on its side, it will break with very little pressure. That is why, when you break an egg, you always strike the side.

26 :: Where do you put the oil in a compressor?

In the reciprocating compressors, you fill the crankcase with the lubricante.

In screw compressors, there is a reservoir to separate oil from compressed air, that reservoir works as the oil sump of the screw compressor.

27 :: What is a pneumatic system?

Pneumatic system is a system that uses air to power something. For instance, have you seen the tube systems at bank drive-up tellers? Air is used to push the tubes back and forth from the teller to the customer.

Air is also used to power drills, sanders, grinders, and the like at garages and car body shops.

28 :: What kinds of pipes are used for steam lines?

Normally galvanized pipes are not used for steam. Mild steel with screwed or welded fittings are the norm. Pressure and temperature are very important factors to be considered in what type of materials to be used. Steam even at low pressures can be extremely dangerous.

29 :: What is the difference between shear center flexural center of twist and elastic center?

The shear center is the centroid of a cross-section. The flexural center is the center of twist, which is the point on a beam that you can add a load without torsion. The elastic

center is located at the center of gravity. If the object is homogeneous and symmetrical in both directions of the cross-section then they are all equivalent.

30 :: What is ferrite?

Magnetic iron rock

31 :: What is the difference between projectile motion and a rocket motion?

A projectile has no motor/rocket on it, so all of its momentum is given to it as it is launched. An example of a projectile would be pen that you throw across a room.

A rocket or missile does have a motor/rocket on it so it can accelerate itself while moving and so resist other forces such as gravity.

32 :: Is shear thinning fluids and the linear viscoelastic fluids are the same?

No

33 :: What is the difference between the flight of a plane and a helicopter?

Both use the pressure difference caused by air moving over the wings at different speeds to generate lift a plane by moving those wings in the direction of travel, a helicopter by spinning the "wings" around at high speed.

34 :: What is jet plane?

An aircraft powered by a jet engine.

35 :: How does length and initial angle affect the period in a simple pendulum?

The longer the pendulum is the greater the period of each swing. If you increase the length four times, you will double the period.

It is hard to notice, but the period of a pendulum does depend on the angle of oscillation. For small angles, the period is constant and depends only on the length of the pendulum. As the angle of oscillation (amplitude) is increased, additional factors of a Taylor approximation become important. ($T=2\pi\sqrt{L/g} [1+\theta^2/16+\dots]$) and the period increases.

Interestingly, if the pendulum is supported by a very light wire then the mass of the object at the end of the pendulum does not affect the period. Obviously, the greater the mass, the less any air friction, or friction at the pivot will slow the pendulum. Also

interestingly, the pendulum period is dependant on the force of gravity on the object (g). One must not assume that g is constant for all places on Earth.

36 :: How does a Coal Power station produce electricity?

A fossil fuel power plant (FFPP) (also known as steam electric power plant in the US, thermal power plant in Asia, or power station in the UK) is an energy conversion center designed on a large scale for continuous operation. Just as a battery converts relatively small amounts of chemical energy into electricity for temporary or intermittent use, the FFPP converts the energy stored in fossil fuels such as coal, oil, or natural gas successively into thermal energy, mechanical energy, and finally electric energy for continuous use and distribution across a wide geographic area.

Usually, the coal is utilized to convert water into steam in boilers (thermal energy). The steam is then used to drive steam turbines (mechanical energy). The turbine shaft is coupled to a generator shaft, which generates electricity.

37 :: What is a cotter joint?

These types of joints are used to connect two rods, which are under compressive or tensile stress. The ends of the rods are in the manner of a socket and shaft that fit together and the cotter is driven into a slot that is common to both pieces drawing them tightly together. The tensile strength of the steel is proportionate to the strength needed to offset the stress on the material divided by the number of joints employed.

38 :: What are the thermal conductivity properties of brass?

109 W/ (m*K) @ 300K

39 :: What is the gas constant R for air?

Air gas constant is $R_{air} = R/28.97 = 0.2869 \text{ (J/g K)} = 286.9 \text{ (J/kg K)}$

40 :: What is the alloy of tin and lead?

A tin and lead alloy is commonly called solder. Usually solder is a wire with a rosin core used for soldering. The rosin core acts as a flux.

41 :: What does F.O.F. stand for in piping design?

FOF stands for Face of Flange. A flange has either of the two types of faces:

- * a) Raised face
- * b) Flat face

The F.O.F is used to know the accurate dimension of the flange in order to avoid the minute errors in measurement in case of vertical or horizontal pipelines.

42 :: Why is the suction pipe of vapor compression and refrigeration system insulated?

The vapor compression and refrigeration system is used to minimize sweating of the air around the pipe. When the air is exposed to a cool surface, its water vapor condenses.

43 :: What is the full form of WCB in ASTM?

American Society for Testing and Matreails

44 :: What is the main purpose of an airspeed indicator in an aircraft?

The primary purpose of an airspeed indicator in an aircraft is to give the pilot some sense of how fast the aircraft is moving. A pitot tube, which is a forward pointing hollow tube that is mounted on the plane, is pressurized by the force of the air the plane encounters as it flies. This air pressure is compared to a static reference, and the difference is proportional to the airspeed. The faster the plane moves, the higher the pressure in the Pitot tube, and the greater the difference between that and the reference. All that will result in higher indicated air speed. There are some issues associated with the accuracy of the system (like when the plane is flying into a headwind), and information on. The pictures are informative, and a reader can pick up a handful of specialized terms relating to the device and the principles upon which it operates.

45 :: What is a uniformly distributed load?

A UDL or uniformly distributed load is a load, which is spread over a beam in such a way that each unit length is laded to the same extent.

46 :: What are the differences between pneumatics and hydraulics?

- * a) Working fluid: Pneumatics use air, Hydraulics use Oil
- * b) Power: Pneumatic power less than hydraulic power
- * c) Size: P components are smaller than H components
- * d) Leakage: Leaks in hydraulics cause fluid to be sticking around the components. In pneumatics, air is leaked into the atmosphere.
- * e) Pneumatics obtain power from an air compressor while hydraulics require a pump
- * f) Air is compressible, hydraulic oil is not

47 :: What is enthalpy?

Enthalpy is the heat content of a chemical system.

48 :: What is a positive displacement pump?

A positive displacement pump causes a liquid or gas to move by trapping a fixed amount of fluid or gas and then forcing (displacing) that trapped volume into the discharge pipe. Positive displacement pumps can be further classified as either rotary-type (for example the rotary vane) or lobe pumps similar to oil pumps used in car engines. These pumps give a non-pulsating output or displacement unlike the reciprocating pumps. Hence, they are called positive displacement pumps.

49 :: Why would you use hydraulics rather than pneumatics?

Hydraulics is suitable for higher forces & precise motion than pneumatics. This is because hydraulic systems generally run at significantly higher pressures than pneumatics systems. Movements are more precise (repeatable) because hydraulics uses an incompressible liquid to transfer power whilst pneumatics uses gases.

Pneumatic systems have some advantages too. They are usually significantly cheaper than hydraulic systems, can move faster (gas much less viscous than oil) and do not leak oil if they develop a leak.

50 :: What is the formula for Heat loss in a pipe?

Pipes are generally cylindrical in structure of amount of heat loss through pipe is given by the formula

$$Q = 2 \pi k L (T_1 - T_2) / \ln (r_2 / r_1)$$

Where

k=conductivity of material of which pipe is made

T₁= temperature of inside layer pipe

T₂=temperature outside layer of pipe

L= length of pipe

r₁= inner radius

r₂=outer radius

ln=natural logarithm

pi=22/7

The above condition applies for steady state flow, single layer over cylinder and

neglecting conductivity

To take conductivity into account term Q^* must be added

$$Q^* = 2 \pi L \{r_1 h_i (T_i - T_1) + r_2 h_o (T_2 - T_o)\}$$

h_i = convective coefficient for inside layer

h_o = convective coefficient for outside layer

T_i = temperature of inside space of pipe

T_o = temperature of outside space of pipe

51 :: What was the spinning jenny?

The spinning jenny is a multi-spool spinning wheel. It was invented circa 1764 by James Hargreaves in Stanhill, near Blackburn, Lancashire in the north west of England (although Thomas Highs is another candidate identified as the inventor).

52 :: Who invented the four-stroke engine?

Nikolavs August Otto, German

53 :: What is meant by payload for aircraft?

The payload is the cargo that it carries.

54 :: Who invented springs?

Rawat

55 :: How fast is a jet plane?

Fighter jet aircraft fly at speeds in the low mach numbers. Mach 1 is roughly 750 miles per hour, give or take, and military jets can fly at well over a thousand miles per hour. Back in the day (July of 1976), the SR-71 set the jet speed record. Radar clocked the thing at 2242 mph. Oh, and the record still stands. This highly sensitive aircraft project probably holds back data that would top this figure, but the information will not be coming out soon if it exists. The Blackbird is the answer to your prayers. As a caveat, there is a much faster jet called a scramjet, but it is unmanned. The NASA X-43A can hit Mach 9.6, which is about 7300 miles per hour.

56 :: What are the uses of windmill?

Windmills were traditionally used for processing grains, later they started to be used for electricity production as well. Windmills can also be used to pump water.

57 :: What is isometric drawing?

It is a 3-D drawing used by draftsmen, architects etc

58 :: How does iron ore turn into steel?

To make Steel, Iron Ore is refined into iron and all the carbon is burned away using very high heat (Bessemer). A percentage of Carbon (and other trace elements) are added back to make steel.

59 :: What is the world's hardest metal?

Rhenium diboride

60 :: What is a machine shop?

A facility that uses machines to fabricate devices from stock raw materials or to modify mechanisms based upon provided specifications. Also, known as "Back" Shops.

The common machines in a machine shop are a lathe, a drilling m/c, a miller, a shaper/planer, grinding machine and so on.

61 :: What are the advantages of gear drive?

In general, gear drive is useful for power transmission between two shafts, which are near to each other (at most at 1m distance). In addition, it has maximum efficiency while transmitting power. It is durable compared to other such as belts chain drives etc. You can change the power to speed ratio.

Advantages: -

It is used to get various speeds in different load conditions.

It increases fuel efficiency.

Increases engine efficiency.

Need less power input when operated manually.

62 :: Why is thick steel wire stronger than thin steel wire?

The material will yield when stress reaches a critical value.

Stress = Load / Area

Thick steel wire is stronger than thin steel wire because there is more cross-sectional area in the thick wire. Although the material's strength in load per unit area would be the

same, the ultimate load that the wire can sustain would be more in the thick wire.

A simple way of looking at it is to imagine a thick wire as a number of thin wires stuck together. If a thin wire can support a mass of 1kg then 2 thin wires can support 2kg. A wire which is twice as thick (twice the cross sectional area) can also support 2kg.

63 :: What is the coefficient expansion of transformer oil?

Transformers can be filled with various types of Refined Mineral Oil. That coefficient is something you would find in specifications of the supplier.

64 :: What is a clock maker called?

A watchmaker or clockmaker is called a horologist.

65 :: What are the types of sensors and their explanation?

There are many types of sensors. They are used to measure and/or detect a huge variety of conditions including temperature, pressure, level, humidity, speed, motion, distance, light, or the presence/absence of an object and many other types.

Sensors in some cases react to the environment in which they are placed and this reaction is used to measure the property being sensed. For example, a common temperature detector is known as an RTD (resistance temperature detector) and this contains a platinum wire. The electrical resistance of the wire changes with temperature so how the resistance changes can be used to measure the temperature.

Many sensors use this type of principle where the variation of an electrical property of a sensing element is a measure of a property being sensed.

Other types of sensors emit a signal and either measure how the area reacts to the emission or measure the reflection of the signal bouncing off an object in front. Inductive proximity sensors are one of the commonest sensors in use today. They emit a small electromagnetic field and use this to sense the properties of the area in front of the sensor.

66 :: What is 1810 stainless steel?

1810 Stainless Steel is the European grade that is equivalent to AISI 304 Stainless Steel. It is the most common stainless steel going. Here is the rundown:

Fe, <0.08% C, 17.5-20% Cr, 8-11% Ni, <2% Mn, <1% Si, <0.045% P, <0.03% S

67 :: How is natural gas better than LPG?

Without getting into the chemistry and physics of the two different types of gases, natural gas has a higher but output than liquid propane gas. In other words, higher the available energy output/more energy is efficient.

68 :: How can heat be applied to acrylic?

In most hardware stores, you can find what has called a Heat Gun. Hold the heat gun about 6 inches away from the acrylic you intend on bending say the bumper on a car. They are plastic these days, but will melt when you apply heat to them. Using a cold scraper, you can usually mold two pieces back together using the heat gun.

69 :: Did Elevation affect weight?

The acceleration of Gravity is less, as you get further away from the center of the earth. This would cause you to weigh less. The equation for the force of gravity is $GMm/(R^2)$. Where G is the universal Gravity Constant which is something like 6.67×10^{-11} and M is the mass of the earth, and m is the mass of the weight being measured. R is the distance from the center of the earth that increases as you increase in altitude.

70 :: Which conducts heat faster steel copper or brass?

Copper conducts heat faster than steel or brass. Any material that is good for conducting heat is also good for electricity in most cases. Wood terrible for transferring heat thus is also insulator for electric.

71 :: What is the Device that converts sound energy into mechanical energy?

Sound energy is mechanical energy. No devices are required to make a conversion.

72 :: What is a mechanism?

A mechanism is a system of moving parts that changes an input motion and force into a desired output motion and force.

73 :: Accelerometers measure acceleration. How do you measure the moment of inertia?

You calculate it using your moment of inertia equations corresponding to the geometry of the object. There is no simple device I do not think that you can buy to just measure it.

74 :: Who built the first rocket that Robert Goddard invented?

Goddard built his own early rockets.

75 :: What is a slined joint?

Cotter Pin

76 :: How pipe flanges are electrically insulated?

Pipe flanges are protected from corrosion by means of electrolysis, with dielectric flanges. The piping system is electrically insulated by what is called a sacrificial anode. A bag of readily corrodible metal is buried in the ground with a wire running from the pipe to the bag so that the sacrificial anode will corrode first. If any electrical current charges the pipe, it also serves as a ground.

77 :: Why would some industries select pneumatics over hydraulic?

Actually, there is need for air reservoir in industrial pneumatics systems. Hydraulics can handle more powerful applications than pneumatics for the same overall dimensions, or can be more compact for the same power.

78 :: What is a Process Flow Diagram?

A Process Flow Diagram (or System Flow Diagram) shows the relationships between the major components in the system. It also has basic information concerning the material balance for the process.

79 :: How do you convert 95 feet into square feet?

You cannot convert feet into square feet; they are two entirely different and incompatible units. Converting feet to square feet is like converting apples to oranges.

A linear foot is a unit of distance. A square foot is a unit of area. If you have a rectangular surface, you can compute the area in square feet by multiplying the length in feet by the width in feet. For example, a rectangular patio that is 12 feet wide by 15 feet long has an area of $12 \times 15 = 180$ square feet.

80 :: What is difference between mill and mill-drill?

Today many manufactures are combining machines; a mill/drill is one of these. It is a combination of a drill and a mill, a mill removes stock from material (usually metal, but not limited just to metal, it depends on your application), you use fluted cutters such-as end mills. The drill aspect of the machine is just that it drills holes, with the proper speed for the right size drill.

81 :: Where pneumatic system is used?

Any system needs redundancy in work needs pneumatics, because the compressor of the pneumatic system has periodical operations (intermittent work, not as hydraulic pump). The compressed air could be accumulated in tanks with high pressures and used even if the compressor failed.

82 :: What is brain of the computer?

The processor (or CPU) is the brain of the computer. This is the part, which does all the "thinking", i.e. maths.

There is no information stored in the CPU, the information is held in the hard disk, and is fished out, acted on by the CPU, and so on.

83 :: What is a vee used for on the Vee Block?

It holds round/cylindrical material. It is usually used to judge the cylindricity of the cylindrical material.

Normally 90 degrees vee can be used for the marking of the cylindrical cross section surface, level checking.

84 :: How many litres did 1 cubic meter contains?

1000 litre in a cubic meter

85 :: What is the weight of 1m³ of seawater?

1 m³ = 1000 lits

And 1 lit = 1 kg (approx)

Therefore 1 m³ = 1000 kg (approx)

86 :: In 1983 what changed about the length of the meter?

The French were the first to define the length of a meter by using an alluminium/platinum alloy bar of a meter length at 25 degrees Celsius. This however is very inaccurate for quantum measurements, as the length of the bar would change too much depending on how you hold it. A better measurement found in 1983 is the distance that light travels in a vacuum in 1/229,792,458ths of a second. (For those of us with a decent knowledge of relativity that measurement is taken in the rest frame). Crazy I know but at least this way any body in a good physics lab can reproduce this distance without the use of some silly French rod.

87 :: What are the advantages of powder metallurgy?

Power metallurgy is much faster production while holding closer sizes.

88 :: What are examples of a first class lever?

Examples of some first class levers are scissor, seesaw, hammer, and wrench.

89 :: How does a boat measure speed?

Knots one nautical mile per hour there are $1 \frac{1}{8}$ of a nautical mile in a statute mile

Originally measured by throwing a piece of wood attached to a piece of rope over the back of a boat and counting how many knots went past in a given time.

These days it is more normally measured by:

- * a) Using a pitot static tube which measure difference in pressure and uses Bernoulli's equation to find the velocity.
- * b) Some form of propeller (technically impeller) which is suspended under the boat. The passing water turns, the speed of rotation is measured, and this gives you the speed of the boat.
- * c) Using ultrasonic to measure the speed, that small bubbles of air in the water passing under the boat go past.

90 :: What is a steam turbine diaphragm?

Steam turbine comprises of stages, number and size of the stages depends upon the break horsepower of the turbine.

The stage has set of moving and fixed blades. The moving blades are attached to the rotor while the stationary blades are called Diaphragm.

The diaphragm guides the steam to glide over the moving blades for producing rotary motion.

91 :: What is wrap-around?

The main purpose of a wrap-a-round is to make a straight line around a pipe to aid in cutting the pipe to its proper length. It is used mostly as a template or a straight edge.

92 :: What instrument in a car measures its speed?

The speedometer and speedometer cable tells the driver how fast the vehicle is going.

What has called a Hall-Effect sensor is used. It uses the principle of magnetic inductance. When a magnetic flux passes through coils of wire, voltage is generated. To use this effect, a magnet is placed in the cars differential. The sensor then can tell when the

magnet comes around by a spike in voltage. Since there is a constant amount the car moves with each differential rotation, and with the time between voltage spikes, you can easily divide to get the speed.

This is why changing your cars tires will affect your speedometer. Your car assumes that car moves a certain amount with each differential rotation. If you have larger tires on, then each differential rotation (and axle rotation) your car moves further, and you will move faster than indicated.

93 :: Can an airplane fly without a tail?

There are a number of aircraft, which are designed without tail assemblies. As for aircraft designed with a tail assembly that may lose it in flight, that's problematic for the flight crew, but there have been instances of portions of tail assemblies being lost due to structural failure or accident that have managed to successfully land.

94 :: Will going from a 3 tap to a 6 tap increase water pressure?

No, the pressure will be the same, you will get more volume only if your pumps can handle the gpm, to increase pressure you may need a booster pump or a single pump that is rated for your needs.

95 :: Why gas containers are mostly cylindrical in shape?

The most efficient shape for withstanding high pressure is a sphere but that would be costly to manufacture. A cylinder with a domed top and a domed bottom (look underneath, the flat base is actually welded around the outside, the bottom of the gas container is actually domed) is a much cheaper shape to manufacture whilst still having good strength to resist the internal gas pressure.

96 :: When was the first space rocket built?

1890

97 :: How does a hammer mill work?

Big hammers (not the kind you pound nails with) spin out with centrifugal force and beat whatever it is you are grinding into smaller pieces.

98 :: What are some mechanical laboratory apparatuses?

Welding machine

99 :: How does a modern submarine move?

Modern submarines move by using some motor to drive a propeller (called a screw). The big u-boats have nuclear reactors that heat water to make steam and have steam turbines that drive the screw through a big reduction gear. Many smaller submarines use a battery bank and electric motors with little propellers on them to move.

100 :: Is a diesel engines maximum rpm limited by the diesel burn rate?

Yes. In practice however, the maximum rpm is usually limited by the construction of the rotating assembly and the high-pressure injection parts.

101 :: How do you calculate cooling energy?

Required cooling involves calculating the heat leaks into the cooled space. This could involve solar loading, the heat leak through a wall or a window. Maybe the structural supports hold up a detector at cryogenic temperatures. Typically, you know something about how the amount of the heat leak varies with the temperature at its two sides. House insulation and windows have an R-value that tells you how much heat leaks through as a function of the internal and external temperatures.

Once you know the load, you can calculate the amount of energy required to provide that much cooling. An air conditioner sold in the United States will have an "Energy Efficiency Rating" that tells how many BTUs/hr of cooling are produced per watt of electrical power input. So if you need 5000 BTU of cooling and your A.C. has an EER of 10, you will need $5000/10 = 500$ W of electrical power to run it.

In a country that uses a sensible unit system the cooling requirement and the electrical power, are both measured in Watts, so an A.C. will simply have a coefficient of performance (COP) which is the Watts of cooling per Watt of electrical power? COPs for typical air conditioners is about 3, so in the above example you would have calculated that you needed 1450 W of cooling, and with a COP of 3 you would need 480 W.

102 :: How is martensite structure formed in steel?

Martensite transformation begins when austenite is cooled below a certain critical temperature, called the martensite start temperature. As we go below the martensite start temperature, more and more martensite forms and complete transformation occurs only at a temperature called martensite finish temperature. Formation of martensite requires that the austenite phase must be cooled rapidly.

103 :: What is the difference between "Stress and Strain"?

Stress is Load per unit Area. Strain is Change in Dimension (dL) Divided by Original Dimension (L), dL/L .

104 :: What is an orthographic drawing?

Orthographic projections are views of a 3D object, showing 3 faces of it. The 3 drawings are aligned so that if the page were folded, it would create part of the shape. It is also

called multiview projections.

The 3 faces of an object consist of its plan view, front view and side view. There are 2 types of orthographic projection, which are 1st angle projection and 3rd angle projection.

105 :: What is the Density of plastic?

Plastics are the general term for a wide range of synthetic or semisynthetic polymerization products. There are many different plastics; all have their own density!

Most common plastics, however, have a density between .035 and .045 lb/cu in.

106 :: What are different types of gate valves?

There are a few different designs:

Parallel disk gate valves use two disks with a spring in between them, sliding into the seats. At low pressure, the spring forces the disks outward against the seats, sealing off the valve. At high pressure, all the sealing is accomplished by the downstream disk.

Wedge gate valves use a tapered disk that slides into two seats set at a slight, converging angle. The wedging action provides the sealing force between the disk and the seat.

Single disk gate valves are used where the flow is always one-way (like sluices on dams). There is some flexibility in the attachment of the disk to the stem, so the differential pressure on the disk pushes it against the seat, sealing it off.

107 :: Do you need to be an apprentice for mechanical engineering?

Most engineering jobs require at least a 4-year engineering degree. Since much of being an engineer is learned "on the job" it is good to have an internship or co-operative experience while in school, but it is not required for all engineering programs (some colleges do require it). You can get a job without an internship or co-op, but you should plan to "wow" them at your interview! It is always a good idea to get involved with engineering projects outside of the educational program, such as research or an engineering club. This shows employers that you have had some experience in a real working environment.

108 :: What type of paper when made into a paper boat floats longest?

I would use wax paper because of all the different kinds of paper it is the least absorbant.

109 :: How can you convert air mass to air volume?

Mass = density * volume.

Air density is p/RT , where R is the gas constant for air (287 J/kg-K), T is the absolute

temperature, and p is the pressure, equal to 101325 Pa at sea level.

At sea level and room temperature, the density of air is

$\rho = 101325 \text{ N/m}^2 / (287 \text{ N-m/ (kg-K)} * 293 \text{ K})$

or about a) 2 kg/m³)

110 :: Is there a metal that does not contain iron?

Most commercially available aluminum contains some other materials, but only accidental traces of iron, if any. For example, Copper, silver, and gold, same story.

111 :: What is representative elementary volume?

Smallest volume over which measurements can be made that will yield a representative of the whole.

112 :: How do concrete pumps work?

I wonder how concrete pumps work, liquid (fluid) concrete has a big viscosity, how the pump overcomes this big viscosity. I witnessed many times every couple seconds maybe 4-5 seconds the machine emits a loud thump. I think that sound come from pneumatic part of the machine.

113 :: Which is first stress or strain?

They are different measurements of a material under a load.

Stress is the amount of Force per area. If you pull on a bar that has an area of 1/2 square inches with a 5000 pound force then the Stress would be the Force divided by the Area or

Stress = 5000 LB /divided by/ 1/2 In² = 10,000 Pounds per Sq Inch (psi)

Strain is the measurement of the deflection of a material under a load. This measurement is very small and it is described in terms of Inches of deflection per the original length in Inches of the part.

Strain is measured as In/In. Under a given load, the stress will be present and the part will deflect. The chair you are sitting in has deflected ever so slightly while carrying your weight.

114 :: What are the advantages of diesel engines?

The advantages of diesel engines are:

- * a) Fuel economy
- * b) Less maintenance

- * c) Run cooler
- * d) More power @ lower RPM's

115 :: What is wet corrosion and galvanic corrosion?

Galvanic corrosion is an electrochemical process in which one metal corrodes preferentially when in electrical contact with a different type of metal and both metals are immersed in an electrolyte.

When two or more different sorts of metal come into contact in the presence of an electrolyte, a galvanic couple is set up as different metals have different electrode potentials. The electrolyte provides a means for ion migration whereby metallic ions can move from the anode to the cathode. This leads to the anodic metal corroding more quickly than it otherwise would; the corrosion of the cathodic metal is retarded even to the point of stopping. The presence of electrolyte and a conducting path between the metals may cause corrosion where otherwise neither metal alone would have corroded.

Wet Corrosion: The main feature of corrosion of a divalent metal M in an aqueous solution containing oxygen is because of the corrosion process consists of an anodic and a cathodic reaction. In the anodic reaction (oxidation), the metal is dissolved and transferred to the solution as ions M^{2+} . The cathodic reaction in the example is reduction of oxygen. It is seen that the process makes an electrical circuit without any accumulation of charges.

The electrons released by the anodic reaction are conducted through the metal to the cathodic area where they are consumed in the cathodic reaction. A necessary condition for such a corrosion process is that the environment is a conducting liquid (an electrolyte) that is in contact with the metal. The electrical circuit is closed by ion conduction through the electrolyte. In accordance with the conditions, this dissolution process is called wet corrosion, and the mechanism is typically electrochemical.

116 :: Why are LNG pipes curved?

LNG pipes are curved because LNG is condensed gas (-164 deg cel) so it can expand the pipes that is what engineers designed the LNG pipes are curve type.

117 :: Where do railway steam engines carry there water?

In the large tank on the front of the engine

118 :: How does an equal-arm balance work?

Two pans of equal balances are placed at the end of the beam, one at each end. A long pointer attached at right angles to the beam at the point of support. Zero on a scale indicates the beam is at rest.

119 :: Why do you need a keyway in the construction of a wall?

A keyway is found in a wall made of concrete where there is two separate pours, which abut themselves, otherwise referred to as a cold joint. It makes sense to insert a concave keyway continuously along the length and in the center of a section of the first wall section poured to receive an abutting concrete pour later. This inserted keyway creates an interlocking style effect between the two abutting pours, which creates a higher quality connection than simply butting the two pours with nothing to interconnect them.

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120 :: What is the history on the invention of paper?

Paper was invented in Egypt and was originally made from papyrus.

121 :: What kind of paper airplane flies the farthest?

Thickest paper has the greatest mass and therefore potential energy. Potential energy equals kinetic energy (speed). Speed equals lift. Lift equals a greater flight distance. Thicker planes fly farther.

122 :: What does a rolling offset look like?

Rolling offsets are used in the piping and sheet metal (ductwork) trades, a rolling offset changes the elevation and location of the piping or duct usually by using two fittings to offset around obstacles. Rolling offsets are used mostly when you are limited to the size of the fittings in order to change your elevation and location.

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123 :: What is the difference between upstream and downstream in a refinery?

The total process of a the refining business starts at the oil field or gas field and runs all the way to the sending of processed hydrocarbon to a final user. Upstream applies to the operation of exploration, drilling, hydrocarbon production, and transmission via truck, rail or ship or pipeline to the refinery intake valve.

Downstream includes all work done at the refinery, distillation, cracking, reforming, blending storage, mixing and shipping.

The case of heavy oil processing (oil sands etc.) and gas plant operation tend to cross the boundaries somewhat. Most are regarded as upstream operations even though downstream type operations are part of the processes. The production of chemical side products at gas plants (e.g. sulfur) is not generally segregated as a "Chemical Plant" operation.

Additional hydrocarbon production operations such as saddle plants, which remove a component from pipeline gas, are generally lumped with upstream.

124 :: What do you mean by the term thread size Please explain what does 0.125 Inch stand for in 0.125 Inch NPT thread?

One thread per .125 inch or 8 threads per inch

One thread per .125 inch or 8 threads per inch

125 :: What does angular momentum mean?

Angular momentum is an expression of an objects mass and rotational speed.

Momentum is the velocity of an object times it is mass, or how fast something is moving how much it weigh. Therefore, angular momentum is the objects mass times the angular velocity where angular velocity is how fast something is rotating expressed in terms like revolutions per minute or radians per second or degrees per second.

126 :: How many BTU per Hour equals 1 Ton of Air Conditioning?

Air conditioners are rated in three ways, by B.T.U.'s, Tons of Refrigeration, or by Horsepower. One Ton of Refrigeration removes the amount of heat needed to melt one ton of ice in 24 hours. One Ton of Refrigeration can remove 12,000 B.T.U.'s of heat in one hour. The B.T.U. is the amount of heat needed to raise 1 lb. of pure water 1 deg F.

127 :: How much water pressure will come from gravity feed tank, which is 10 metres high?

956 pounds per square inch (psi)

128 :: Can you use motor oil in a hydraulic system?

Hydraulic fluid has to pass a different set of standards than motor oil. Motor oil has tackifiers, lower sulfur content, and other ingredients that could prove harmful to the seals and other components in a hydraulic system. If it is an emergency only should you do it.

129 :: What is the difference between hydraulic oil and engine oil?

Both the hydraulic and engine oils are made from base oils with additives mixed in. The additives used change the characteristics of the oils so that they function differently. Generally, hydraulic oils (final product including additives) are expected to have very low compressibility and very predictable friction and viscosity stability under pressure. Generally engine oils (Engine Lubrication Oils anyway) are intended to have high resistance to heat (degradation including chemical and viscosity due to heat) resistance to burning and resistance to absorption of fuels and chemical compounds produced during combustion.

Both classes of oils are likely to have additives intended to provide detergency and to reduce foaming.

Base oils are most commonly petroleum oil bases due to cost, but other bases oil can be used including mineral oils (especially for hydraulic oils) and plant oils (especially for engine oils) and oils from animal sources.

130 :: Which country has the worlds most powerful tank?

Germany, USA, Russia, and France have the most powerful tanks. Germany's is probably the best after all the USA's man tank the Abrams Uses the German Gun.

131 :: What causes white smoke in two stroke locomotive engines?

That is the engine running too lean (lack of fuel). This condition will lead to overheating and failure of the engine.

132 :: What is the role of nitrogen in welding?

Nitrogen is used to prevent porosity in the welding member by preventing oxygen and air from entering the molten metal during the welding process. Other gases are also used for this purpose such as Argon, Helium, Carbon Dioxide, and the gases given off when the flux burns away during SMAW (stick) welding.

133 :: Is Knowledge of properties of engineering materials is significant in pattern making why?

Yes very important, wheels on car are spun on very hard steel die's not aluminum, the properties of the two metals are very different, one is soft, and the other is hard, (the wearing-out of the metals with extended use). In addition, how materials interact with each other as in coexistence and enhancement. Many things swell and shrink with heat and cold, linen is easier to sew then fleese, patternmakers must take in all factors concerning the product they are working with.

134 :: How does hydraulics work?

A positive displacement pump (gear, vane, or piston pump) is driven by a prime mover (Electrical Motor or Engine) it sucks fluid from reservoir and delivers oil to system. During loading, a resistance to flow creates the pressure, which is utilized to do the work through cylinder for linear motion, or through hydraulic motor for rotary motion, Direction of flow is changed with help of direction control valve & system pressure is regulated by pressure control valve & flow is regulated by flow control valve.

135 :: What color are thermal oil piping lines?

Brownish and sort of grey

136 :: What are examples of mechanisms?

Examples of mechanisms are the workings of a clock, a light switch, and a nail clipper.

137 :: What is the strongest pistol in the world?

Single shot pistol that shot a .50 BMG round is strong and could have been the strongest in the world.

138 :: What is a turboprop engine?

The combination of the words turbine and propeller in techno jargon will give you the word "turboprop". A turboprop engine is a turbojet (gas turbine) engine, which powers the propeller/s.

A conventional jet engine produces its thrust in large part due to the heated gasses escaping out the rear of the engine. While this is very useful for aircraft, which fly at high speeds and high altitudes, it is less desirable for aircraft, which are designed to fly at slower speeds and take off from smaller runways.

A turboprop engine is a jet engine, which converts the bulk of its thrust into rotational energy for powering a propeller. This allows jet engines, which are a high-rpm low-torque engine to be used in situations where low-rpm and high-torque are needed instead. The higher reliability and efficiency of a jet or turboprop engine as compared to an internal combustion engine makes them very desirable for aircraft designs, which, in the past, would have utilized internal combustion engines.

139 :: What is railroad track ballast?

That being said railroad track ballast is the cover for the subgrade. Ballast has several functions:

- * a) It enables water to drain from the track
- * b) It assists in helping control the thermal expansion of continuous welded rail
- * c) As a train passes the rails, it supports the train
- * d) It distributes the weight of the train from the track structure to the sub grade

* e) Maintains a smooth running surface for the train to run on

As ballast becomes contaminated with other materials, it loses its ability to do some or all of these jobs.

140 :: How is a submarine able to submerge and surface?

Submarines have ballast tanks. The tanks can hold air, or they can be "vented" and water can flow into them and fill them completely. When the tanks are full of air, the submarine is buoyant and floats. When the main vents are opened, the tanks are flooded and the submarine submerges. When the submarine is submerged, wants to surface, air can be injected at high pressure into the ballast tanks to force out water, again make the submarine buoyant, and cause it to rise to the surface and float.

In practice, when a submarine surfaces, it doesn't use a lot of air from its high pressure air tanks to "blow the ballast tanks" because it takes a long time to pump up the high pressure air tanks again. What happens is that all the ballast tanks are given a "good shot" of high-pressure air (a few seconds), and then the planes are used in conjunction with the screw (which some call a propellor) to actually drive a submarine to the surface. Once there, something called a low-pressure blower system can be used to finish blowing the ballast tanks (while the high-pressure air compressors are running to pump the high-pressure air tanks back up).

141 :: Who built the Trans Alaska pipeline?

The pipe was constructed in six sections by five different contractors employing 21,000 people at the peak of work.

142 :: Is pipe round because it provides the least area to volume ratio?

More likely because it is easier to manufacture, much easier to put threads on, you do not have to worry about orientation when you put them together, and they have no weak spots created by corners.

My gutter pipes are rectangular because they do not stick out as far from the house as a circular one with the same area. However, they are low enough in the pressure they contain that they can be formed from sheet metal with a crimped seam. Making a water supply pipe, that way would be impossible.

In addition, it is easy to keep them aligned to the house. Running a rectangular water main under a street would be a major pain.

143 :: What does Green field project mean?

Green field projects are those projects, which do not create any environmental nuisance (pollution), follows environmental management system and EIA (environment impact assessment). These projects are usually of big magnitude.

144 :: What are some examples of a periscope?

It is an optical instrument for viewing objects, which are above the level of direct sight; mostly used in submarines.

145 :: What is the difference between an electric motor and an electric generator?

There is no fundamental difference between an electric motor and an electric generator or dynamo. In normal use, all motors behave as generators, and all generators behave as motors. DC Motors act like generators because they use less electrical energy when allowed to spin fast. DC generators act like motors because they become easier to spin when less electrical energy is drawn from their terminals.

For example, connect two small DC magnet motors together. Then if you spin the shaft of the first motor, the second motor's shaft will start spinning too. One acts as a DC generator, and the other acts as a DC motor. Alternatively, spin the second one's shaft, and the first one will start spinning.

Another example: If you connect a small DC motor to a small battery, then an electric current will appear in the motor's coils, and the motor starts spinning. However, if you spin the motor's shaft slightly faster than the normal speed, the direction of current in the circuit will reverse, and the battery starts taking in energy from the motor. The motor has become a generator, and it is recharging the battery. 146 :: **How are the pneumatic system and the hydraulic system similar?**

Pneumatics use gases such as air or nitrogen, hydraulics use oil or water, both systems use pressure to act on a specific application.

147 :: How can I see where pipes are behind the wall?

By using radio waves

148 :: Why do the radiators in your house click when you start the heating system?

They are clicking because they are heating up. The heat causes expansion and that is why you hear clicking.

149 :: How does a super charger work in a car?

A supercharger is used to increase the volume of air dragged into each cylinder per stroke.

In combustion engines, there are only really two ways to increase power, firstly increase the amount of fuel in the engine (either increase the displacement, or add more cylinders) or increase the amount of air in the engine (for a more effective explosion of the fuel)

Superchargers are powered by the engine's crankshaft, which is connected usually by a belt drive. This rotational power turns a fan, which sucks air into the intake manifold similar in effect to turbochargers, with reduced lag. However, superchargers take more energy out of the engine, so swings and roundabouts.

150 :: How much is 1 kN in Kg?

A Newton, N, is a measure of force while a kilogram, kg, is a measure of mass. Therefore, any number of kN does not equal any number of kg.

This however is useful

$$1 \text{ N} = 1 \text{ kg} \cdot \text{m} \cdot \text{s}^{-2}$$

edit:

$$F = m \times a$$

[F=force; m= mass; a=acceleration (g in case of acceleration due to gravity = 9.80665 m/s^2)]

$$m = F/g = 1/9.80665 = 0.10197 \text{ Kg}$$

151 :: Is it the stress that, produces strain or strain produces stress?

A Force applied to an object will cause a displacement. Strain is effectively a measure of this displacement (change in length divided by original length).

Stress is the Force applied divided by the area it is applied. (E.g. pounds per square inch)

Therefore, to answer the question, the applied force produces both "Stress and Strain". "Stress and Strain" are linked together by various material properties such as Poisson's ratio and Young's Modulus.

152 :: What is the Law of Thermodynamics?

There are actually 3 Laws of Thermodynamics (the actual number is debatable, but the number ranges from 3-5, depending on your adding skills).

153 :: Will a steel cable become longer if it is heated while under load?

Even the heaviest steel cables stretch under load, whether they heat or not. Heating the cable will certainly elongate it. Friction caused by guides or pulleys can greatly increase the temperature of a cable under load.

You might consider the possibility of total failure if the heat is high enough and I am not sure but the cable might act in unpredictable ways when it fails. Applying heat to a steel cable under load is probably dangerous to your health and the health of anyone nearby.

When steel is heated, steel expands. It does not need to be under load. That is the reason that in the old days before advanced electronics and optics surveyors used chains rather than cables for measuring land. Had they used cable they would have gotten different measurements in summer and winter based on the difference in temperature and the coefficient of expansion of the material. The coefficient of expansion is a number that informs just how much a given material will expand or contract for a given change in temperature. To find the coefficient of expansion and other interesting information consult a materials handbook, available in better libraries or your local college of engineering. Another example of expanding steel and the necessity for dealing with this characteristic is the overlapping slip joint found on bridges that allows horizontal structural members to expand and contract without damaging the bridge.

154 :: What is the Congressional Space Medal of Honor?

The medal was created in 1969, designed by Congress for "any astronaut who in the performance of his duties has distinguished himself by exceptionally meritorious efforts and contributions to the welfare of the Nation and mankind.

155 :: Why will an ice cube placed in a cup of hot rotating water spin automatically faster than the water itself?

The center of a whirlpool is spinning the fastest. The cube is in the center so it is spinning equal or slower than the water directly under it but the water near the edge of the cup is spinning slower put something in the toilet, flush it, and observe how it spins faster as it reaches the center use something that will not clog the toilet.

156 :: How does hydraulic clutches work?

By using a non-compressible fluid, it acts like a solid push rod.

157 :: Why is over-pressurizing an Air Conditioning system bad?

Overcharging a refrigeration or air conditioning system can result in an explosion. To avoid serious injury or death, never overcharge the system. Always use proper charging techniques. Limit charge amounts to those specified on the system equipment serial label or in the original equipment manufacturer's service information.

Overcharging the system immerses the compressor motor, piston, connecting rods, and cylinders in liquid refrigerant. This creates a hydraulic block preventing the compressor from starting. The hydraulic block is also known as locked rotor.

Continued supply of electricity to the system causes heat to build in the compressor. This

heat will eventually vaporize the refrigerant and rapidly increase system pressure. If, for any reason, the thermal protector fails to open the electrical circuit, system pressure can raise to high enough levels to cause a compressor-housing explosion.

158 :: What is the difference between blower and fan?

A fan can turn air, but a blower forces the air faster.

159 :: What is the date of first Titan launch from Cape Canaveral?

The Titan I was launched from Launch Pad 15 on February 6 1959.

160 :: What is knurling?

Knurling is a machining process normally carried out on a centre lathe. The act of Knurling creates a raised criss-cross pattern on a smooth round bar that could be used as a handle or something that requires extra grip.

161 :: What is the mechanical advantage of a double pulley?

It only takes half the effort to move an object but twice the distance.

162 :: What is extruded aluminum?

Extrusion is the process where a metal or a metal bar is pulled through a mandrel to elongate it and/or give it a final shape.

Extruded Aluminum is a common form of making small aluminum wire, bars or beams and many varieties of small non-structural, decorative pieces.