Increase in kinetic energy engineering essay

Engineering

An orifice plate is a thin plate with a hole in middle. The main function of the orifice is accomplished by thishole. As the fluid reaches the orifice plate it constricts theflow of fluid, which then result in difference in pressureand velocity of fluid. Source: www. efunda. comTheory http://www. efunda. com/formulae/fluids/images/DP_OrificePlate_cal. gifThe hole in orifice plate will result in the reduction ofcross-sectional area of the duct. In order to maintain aconstant flow rate, the velocity of the fluid must increasethrough the orifice. This increase in kinetic energy must bebalanced by a decrease in other form of energy, so pressure is decreased thus difference in pressure is created before and after plate which are measured by pressure taps before and ofter. so using relation delta p= v, flow rate can be calculated

Hot wire anemometer

Hot wire anemometer consist of a sensor, a small electrically heated wire exposed to fluid and an electronic equipment. the work of electronic equipment is to convert the information from sensor and measure air velocity. The tip of instrument consist of hot wire, the current is provided to hot wire to enable it to maintain constant tempereature or in contrast temperature may allowed to vary and electrical resistance being measured. The working principle behind this device is that, as the wire which is of higher temperature is exposed to fluid there is a drop of heat energy. The more the air velocity, more the heat lost. Therefore according to to forced-air convection heat transfer theory a relationship between heat lost and velocity can be created and hence air flow can be measuredThese work on the principle of forced convective cooling. A fine electrically heated wire is exposed to the air stream. The greater the air velocity the greater the rate of

heat loss. The wire may be maintained electronically at a constant temperature and the current required measured or the temperature allowed to vary and the wire resistance measured. An electronic meter then calculates the air velocity. Someanemometers use a thermistor rather than a wire. The sensing head is typically 10 mm in diameter so providing a point velocity. These anemometers require regular calibration. Anemometer basic principle is a thin metal wire on fluid, electricity flow heating wire, make its temperature higher than fluid temperature, so will wire wind speed program called " hotline". When fluid flows along vertical direction when metal wire, metal wire will take part of, the metal wire heat temperature drop. According to forced-air convection heat transfer theory, can be used to deduce hotline dissipating heat with fluid speed v qq in relation between deposit. Standard hotline probe by two root stents tensioner a piece of short and thin metal wire composition. Wire usually use platinum and rhodium, w and melting point, high ductility good metal. http://www. kingtill. com/The-working-principle-of-digital-anemometer-n-77. htmlPitotic static tubeThe flow entering the pitot-static tube at the open end is brought to rest (U= 0) at http://www. flowkinetics. com/images/fig1. pngthe stagnation point. This tube provides the total pressure. The static pressure must bemeasured perpendicular to the flow, thus ignoring the effects of velocity. This is www. flowkinetics. comaccomplished by using carefully positioned holes in the side of the pitot-static tube. A tube placed in a duct facing into the direction of the flow will measure thetotal pressure in the duct. If frictional losses are neglected, the mean totalpressure at any cross section throughout the duct system is constant. Static pressure can only be determined accurately by measuring it in amanner such that the velocity pressure has no influence on

themeasurement at all. This is carried out by measuring it through a small holeat the wall of the duct; or a series of holes positioned at right angles to theflow in a surface lying parallel to the lines of flow. The pitot static tube is anexample of this. Figure 1 shows the principle of the pitot static tube.

Figure 1. Principle of the pitot static tube.

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Pitot static tubeThe Pitot Static tube measures the total pressure (or impact pressure) at the nose of the Pitot tube and the static pressure of the gas stream at side ports. The difference of these pressures, i. e. the dynamic or velocity pressure (Pdynamic) varies with the square of the gas velocityhttp://aa. static. facdn. com/v/img/1x1. gif

Pitotic static tube is a device consisting of Pitot tube and a static tube joint to measure the total and static pressure in a fluid stream. the total fluid pressure is measured at the nose of pitot tube. . If frictional losses are neglected, the mean total pressure at any cross section through out the duct is constant. on the other hand static pressure is measured through the side ports of tube. static pressure can only be measured correctly if the velocity pressure has no influence at all, which is accompalished by measuring it through a series of holes positioned at right angle to the flow

Principle

It measure pressure difference between 2 points, where one of the point is considered as stagnation point ie v= 0 or static pressure point

Rotatory vane anemometer

The rotary vane anemometer (RVA) consists of a propeller connected to a revolution counter mounted in a short cylindrical frame.. the principle used behind rva is that the number of revolution is directly propotional air velocity. each instrument is calibrated for direct air velocity reading in ft/min, m/min etc. the anemometer is held firmly in front of air flow opening, source: news. thomasnet. comto calculate air velocity. several timed readings are taken and averagedhttp://cfnewsads. thomasnet. com/images/large/827/827363. jpghttps://docs. google. com/viewer? a= v&q= cache: Bw4GnXa3SDQJ: www. jma. go. jp/jma/jma-eng/jma-center/ric/material/1_Lecture_Notes/CP4-Wind. pdf+working+principle+of+rotary+vane+anemometer&hl= en&gl= ukπd= bl&srcid= ADGEEShiW8rBN165XKXeCs2BA_1903m23DQei4B3jQrp9zbS-

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holes on the downstream side to sense throat substatic pressureThe upstream and downstream tubes are connected to separate manifolds, which thus provide two average pressure signals. The pressure difference between the manifolds constitutes the output signal. The principle of the Wilson Flow Grid is based on Bernoulli's Theorem which states that the total energy contained in a moving fluid (e. g. ducted air) is constant. Neglecting friction losses, this energy is the algebraic sum of two pressures: the velocity (or dynamic) pressure and the static (or duct) pressure.. The presence of the Flow Grid creates a local reduction in the free area of the duct. The increase in velocity between the tubes, results in a corresponding reduction in static pressure, which is sampled by the downstream holes. The forward facing holes sample the duct total pressure. These two pressure signals from the differential outputhttp://korins. com/m/air/instr/wilson. htmWilson flow gridthis device consist of series of horizontal or vertical tubes installed across a duct. the tubes are perofarated in such a way that it provide a single differential pressure, which is propotional to square of mean velocity. The flow grid consists of rows of tube parallel to each other forming an open fences across the duct at right angle to the axis. tubes are perforated in two ways, one facing upstream which measure total pressure and other facing downstream to sense static pressure. both the streams are connected to different manifolds, which thus provide two average pressure signals. the pressure difference between manifold tubes is read as output. The principle of flow grid is based on bernoulis theorem, which states that total energy contained in a system is constant. by neclecting frictional forces this energy is sum of dynamic and static pressure. free duct area is reduced due to the presence of flow grid, thus velocity fluid increases which results in the

reduction of static pressure, which is senced by the downstrwam holes. the upstream holes measure the total pressure. these two pressure signals form the differential outputhttp://en. wikipedia. org/wiki/Orifice_plateexperimental procedureapparatus usedBarometerManometerThermometerorifice plateconical inletwillson gridpitot-static tubehot wire anemometerrotator vane anemometerexperimental proceduremeasure the atmospheric pressure using barometermeasure room temperaturemeasurewillson gridinsert the willson grid tube inside ductstart the fan with minimum speedincrease the speed up to 60% and measure the differential pressure reading from digital manometerthen using equation flow rate was calculatedpitotic static tubeinsert the tube inside duct and start the fan at minimum speedincrease the speed upto 60% and measure the differential pressure at several points of the cross section areathen using equation calculate flow ratehot wire anemometerconnect the electronic device to hot wire annemometerinsert the tube inside duct and start the fan at minimum speedincrease the speed up to 60% and measure the velocity from the electronic devicerotator vane anemometerconnect the device with electronic equipmentplace the anemometer in front of fantake readings from electronic equipmentusing equation calculateorifice plate

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