Resolvers

A resolver is, in principle, a rotating transformer. If we consider two windings, A and B, and if we feed winding B with a sinusoidal voltage, a voltage is induced into winding A. If we rotate winding B, the induced voltage is at maximum when the planes of A and B are parallel and at minimum when they are at right angles. Also, the voltage induced into A varies sinusoidally at the frequency of rotation of B so that EOA = Ei sin(theta). If we introduce a third winding (C), positioned at right angles to winding A, as we rotate B, a voltage is induced into this winding and this voltage varies as the cosine of the angle theta, so that EOC = Ei cos(theta).

If you can measure the relative amplitudes of the two winding (A and C) outputs at a particular point in the cycle, these two outputs are unique to that position. The rotation of winding B causes the magnitude of the induced signals to vary as a function of the angular position. The voltage induced in A is in quadrature (at a 90o offset) to the voltage induced in C.

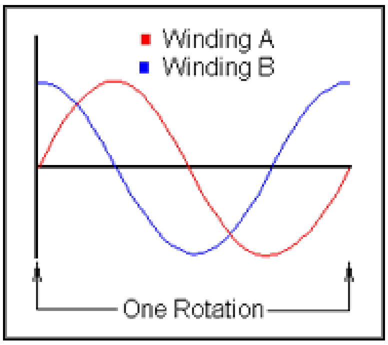
Using the output of the two windings gives an absolute position, since each position has a different combination of A and B. The frequency also changes with the velocity and you can also determine the velocity.

The data output from the two phases is usually converted from analog to digital by means of a resolver-to-digital converter. Resolvers typically achieve a resolution up to 65,536 counts per revolution.

A resolver requires that it receive an excitation AC signal. This signal must have a frequency that is adjustable to the specifications required by the individual resolver. The excitation voltage must also have different settings for the varied resolvers. To obtain the signal at least two channels are necessary to take measurements from both of the sensing coils. From these two measurements you can take an arctangent to obtain the angle of the resolver.

A resolver is an absolute position feedback device which operates as described below.

The stator is made up of two windings, winding A and winding B. Winding A is positioned at a right angle to winding B. The rotor is made up of a third winding, winding C. This is energized with a sinusoidal voltage and allowed to rotate. The signal in winding C induces a signal in both windings A and B. Rotating winding C causes the magnitude of the induced signals to vary as a function of the angular position. The voltage induced in A is in quadrature to the voltage induced in B. Each position along the rotation produces a different value for the combination of A and B. This is illustrated in the following image:



Output from phase A is typically Vi * sin(wt + ph) and the output from phase B is typically Vi * cos(wt + ph). Where
Vi = Voltage in
w = Angular frequency
t = time
ph = phase shift

Using the output of the two windings gives an absolute position, since each position has a different combination of A and B. The frequency also changes with the velocity, the velocity can also be determined.

The data output from the two phases is usually converted from analog to digital by means of a resolver-to-digital converter.

You can typically achieve a resolution up to 65,536 counts per revolution using resolvers.