COMPOUNDING OF STEAM TURBINES

In order for the steam to give up all its kinetic energy to the moving blades in an impulse turbine, it should leave the blades at zero absolute velocity. This condition will exist if the blade velocity is equal to one half of the steam velocity.

Therefore, for good efficiency the blade velocity should be about one half of the steam velocity. If the steam was expanded from initial entry pressure down to final exhaust pressure in a single set of nozzles (single stage) then the velocity of the steam leaving the nozzles might be in the order of 1100 m per second.

§ In order to have good efficiency the blade velocity would have to be of about 550 m per second, which would require excessively high rev/mm of the turbine rotor and failure due to centrifugal force could result.

§ In addition to this, excessively high steam velocity will cause high friction losses in nozzles and blading. A large pressure ratio in a vapour cycle will result in high thermal

efficiency.

But, when expansion of steam takes place from the high initial pressure to the exhaust pressure in only one stage, the velocity of it will be very high and this will set up excessively blade velocities. Further “the lost velocity or the leaving loss” namely; kinetic energy of the fluid leaving the turbine will also be high.

Therefore, in order to restrict the rotational speed of the turbine and also to minimiz the leaving loss, the exhaust steam from the first ring of moving blades is diverted to a second ring of moving blades with the help of a ring of stationary blades.

There may be two or more rings of moving blades keyed to a common shaft and in between two rings of moving blades there will be a ring if stationary blades usually anchored to the turbine casing. This way of reducing rotor speed is known as compounding’.

There are three number of methods of compounding.

- Pressure compounding
- Velocity compounding.
- Pressure-velocity compounding.

Source : http://mediatoget.blogspot.in/2011/10/compounding-of-steam-turbines.html