Governor Encyclopedia Article

Governor

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Prior to the invention of the steam engine, governor-type devices were used to regulate the operation of grinding stones in windmills. Beyond a certain point, increased wind power hampered rather than enhanced productivity and so the idea of a regulating, or governing, device was conceived. Pendulum movement, or the centrifugal action of ball-and-rod contraptions, was the crux of such early governors.

Scottish engineer James Watt was the first person to fully harness and utilize the governor as a control on the power source itself. (The windmill devices only regulated the action of the millstones, not the wind.) In Watt's case, the power source was the steam engine, invented by Thomas Newcomen and then greatly improved by Watt during the 1770s. Around 1788 Watt added a governor to his steam engine. The device consisted of two weights attached to pivoting arms, which in turn were attached to a regulating valve. As engine speed rose, so did the weights, until the regulating valve released steam pressure and thus decreased engine speed. Watt's invention, though subordinate to his overall work with engines, paved the way for increasingly greater factory efficiency and virtually automatic mechanical processes. A governor mounted directly on the flywheel shaft was invented in the early 1870s and an inertia governor, which magnified centrifugal forces and improved steady speed performance, was developed in 1895.

Twentieth-century governors take a variety of forms and may be found in steam turbines, electric motors, and gasoline engines. Automatic transmission in automobiles is an excellent example of how Watt's early work with governors continues to effect modern-day life. Working in conjunction with the oil pump, the governor in an automatic transmission system determines when throttle valve pressure crosses the threshold between low and high gears and then transfers this information to the shift valve. The governor's mechanical role has been greatly expanded beyond its original duty of simple speed regulation.