

Four errors in construction that are sure to destroy energy

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The pressure is increasing: Numerous producing companies in Germany and Europe will have to conduct an energy audit by 5 December. This means that a higher machine and system energy efficiency will definitely be no longer an academic issue but a tough decision criterion for investments. "Already small changes in construction and the use of intelligent automation can help design engineers clearly improve energy efficiency – at maximum productivity," says Dr. Karl Tragl, President of the Executive Board of Bosch Rexroth AG. The company has developed the universal Rexroth 4EE system based on its broad application experience and employs this system to support design engineers in the efforts to implement energy efficient solutions. The following are four errors in machine design that are sure to destroy energy – and four ways of how to avoid them.

Non-consideration of fluctuations in energy demand

Hydraulic constant drives always run at maximum speed, even if the process does not even require full power. In that case, valves must discharge the excess energy. And even worse: They introduce heat to the hydraulic oil which then has to be again extracted. This process consumes a lot of energy. Variable-speed pump drives, on the other hand, produce output current as needed. They even lower the speed under partial load. The result: direct energy savings of up to 80 percent. Moreover, the refrigeration need is often reduced so much that electrical energy is no longer needed for this.

Non-utilization of braking energy

Every acceleration requires subsequent deceleration. Common drive variants destroy the braking energy and turn it into waste heat. Regenerative drives, on the other hand, change the engine to generator mode when braking and thus produce electric power. It can be used to supply power to other drives via an intermediate circuit, to store the energy in an intermediate buffer or to feed it back into the net.

Accepting load peaks as a given

Only a few milliseconds of peak loads, and all power supply components must be permanently designed for maximum loads. By using an intelligent energy management system with feed and feedback, an electric or kinetic mechanical storage and the corresponding software, design engineers can keep the energy, which

was taken from the grid, in the system to use it several times. This way, they will reduce the energy-intensive load peaks and reduce the machines' power consumption by up to 25 percent while keeping their productivity level steady. In the end, all grid and supply components can be sized smaller and will thus become more cost efficient.

Non-optimization of software

Many machinery manufacturers start to operate their prototypes only once the machine has been assembled, which makes energetic optimization very complex and costly. Simulation software could be of great help here. The virtual image takes into account all energy flows inside the machine. Design engineers use it to test various configurations at the computer upfront. They analyze the energetic loss of the electric and hydraulic actuators, check whether the drives are too big and optimize the motion sequences and energy flows at the connected real control. Take, for example, cycle time optimization in machine tools: If one part can be produced in less time, this will also lead to a reduction of the energy portion required by the ancillary components. The Rexroth CNC system solutions software provides analysis and optimization tools to reduce cycle times and to, at the same time, improve energy efficiency. This motion optimization results in notable energy savings even for installed machines.

Source: Bosch Rexroth