

LEONARDO, THE ENGINEER

"Mechanical science is most noble and useful above all others, for by means of it, all animated bodies in motion perform their operations."

Leonardo da Vinci.

These lines, interestingly enough, are from the notebooks of an artist whose images are part of the basic iconography of Western culture. Even people who have never set foot in a museum and wouldn't know a painting by Corregio from a sculpture by Calder, recognize the Mona Lisa. But Leonardo da Vinci was much more than an artist. He was also a man of science who worked in anatomy, botany, cartography, geology, mathematics, aeronautics, optics, mechanics, astronomy, hydraulics, sonics, civil engineering, weaponry and city planning. There was little in nature that did not interest Leonardo enough to at least make a sketch of it. Much of it became a matter of lifelong study. The breadth of his interests, knowledge, foresight, innovation and imagination is difficult to grasp.

Choosing Leonardo da Vinci, the prototypical Renaissance Man, as a role model for a highly specialized technical magazine may seem a little peculiar. What can Leonardo, the man who seemed to know almost everything and seemed to do it all very, very well, say to us in our highly specialized world of gear design and manufacture?

It is the spirit of Leonardo we at GEAR TECHNOLOGY wish to honor and to emulate — the spirit of excellence and the spirit of curiosity.

Leonardo was never satisfied with the way things were. He never ceased to question, to experiment, to improve his own skills and designs. The 5,000-odd pages of his notebooks that still exist are full of sketches of an infinite variety of natural and mechanical objects. He drew hundreds of sketches of various plans for bridges, weapons, clocks and hydraulic systems; for geared machines for lifting, moving, cutting and drilling; for ornithopters, which he hoped would enable humans to fly, and for parachutes, "horseless carriages" and other devices far ahead of his time. Leonardo's vision frequently outstripped the science of his day, and many of his "inventions" were never put into use at the time simply because there was no practical means to power them.

This capacity for dreaming, questioning, experimenting and tinkering until the optimum design is achieved lies at the root of the science of engineering. We cannot all expect to have the breadth of knowledge and talent that Leonardo had, but we can certainly emulate his attitude — that the natural world is full of wonders that can be known, and, once known, turned into machines that make life better, easier and safer for everyone.

Researching and reading about Leonardo is both an interesting and a fulfilling experience. One is constantly astonished by the scope of his skill; even rough sketches in his notebooks are little works of art. His vision — of nature, science and engineering, as well as art — is awesome. Every staff member at GEAR TECHNOLOGY that has worked on the Leonardo covers has been enriched by the experience.

The Leonardo covers have been one of our most consistently popular features among both our readers and our staff. You may



have noticed, however, that on several recent occasions, we did not feature one of his drawings on the cover. The reason for this is simple: We are running out of Leonardo's sketches that feature gearing, and we have little descriptive information for the ones that are left.

Part of the problem is that Leonardo's sketches were never systematically organized. Some of both the charm and the difficulty of the sketchbooks is their spontaneity. Leonardo wrote down or sketched ideas as they came to him, and he rarely went back to edit or categorize his work. It was a project he always intended to undertake . . . Then, after his death, the 5,000 unorganized pages were separated, scattered, in some cases, destroyed. Those portions of the manuscripts remaining are found in a number of museums and libraries throughout the world.

The variety of Leonardo's interests also complicate searching for appropriate sketches. They are apt to show up in books on almost any subject. A hunt for Leonardo's sketches can cover an entire library. The place to start is any good biography of the artist, but from there, the trail can lead almost anywhere.

So we issue you a challenge. Go to your library and spend an afternoon absorbing some of the spirit and wisdom of Leonardo. If you come across in your reading any of his sketches featuring gears or geared mechanisms that have not been featured on our covers, send copies to us, and we will be pleased to share them with the rest of the GEAR TECHNOLOGY audience. We will run these sketches as cover art and credit you and your company as their source.

Eventually, of course, we will completely run out of Leonardo's gear-related sketches. The chances of getting the artist to produce more are slim. However, sketches or no, the spirit of Leonardo will continue to inspire us here at GEAR TECHNOLOGY, and, we hope, will continue to inspire you as well — for inventiveness, intellectual risk taking and simple curiosity are always at the root of success for any engineer.

Michael Goldstein
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