

# Tadeusz Sendzimir: Inventor Extraordinaire

Tadeusz Sendzimir was born in Lwow (then) Poland in 1894, the eldest of four children and the son of a civil servant. World War I put an end to his formal education, and he fled to China, where he married Barbara Alferieff, of Russian nobility. His first son, Michael, was born; and his first industrial venture, a nail factory, was established there. In the 1930s, Dr. Sendzimir immigrated to the United States, where he resided until his death in 1989 at the age of 95.

In 1943, the United States was fully engaged in World War II. Armament production was essential, and the steel company, ARMCO, in Middletown, Ohio, had been asked to find a way to roll 3.5% oriented-grain silicon steel down to 0.002" (0.05 mm) for the production of small transformers that would make airborne radar possible. ARMCO's engineers tried a number of different approaches, but nothing worked. Even the narrow 4-High mill with very small diameter sapphire rolls failed because the high lateral force caused the rolls to snap in the middle.

Dr. Sendzimir had patented a rolling mill that could roll very hard materials down to very light gauges. The first was built in Poland in 1933 at Huta Pokój. The design used the idea of the small work roll – something that ARMCO was well aware of – but it went much further because it transferred the roll separating force to the housing while supporting the load uniformly across the width of the mill and avoiding any lateral bow effects.

The work roll was the key element. Its small diameter took a much higher total reduction than was possible with larger work rolls, such as those found on the 4-High, thus reducing the number of intermediate anneals required. It could be reground quickly to assure a very high surface quality. And its small diameter meant that harder tool steels could be used in its fabrication, thus also contributing to the superior surface quality of Sendzimir-rolled strip.

The work rolls were also chockless, a feature unique to Sendzimir's design, thus eliminating the necessity to remove

and install the chocks each time work rolls were reground. The quick roll changes gave greater control over strip quality; any flaw in a work roll could be almost instantly corrected; roll crown could be quickly changed.

Over the course of his life, Dr. Sendzimir, a self-taught man, produced dozens of inventions whose impact worldwide is still profound. In the 1930s, he was awarded a series of patents for the continuous galvanizing of strip that is the basis of all of today's galvanizing lines. In the 1940s, he was awarded patents for the planetary mill for hot rolling; in the 1960s came a series of strip accumulators, of which the spiral looper is best known; the 1970s saw the rocker mill and the zero-crown housing.

Over the course of his life, Tadeusz Sendzimir also received numerous personal awards, including three honorary doctorates, the Bessemer Gold Medal, the Brinell Gold Medal, the first AISE President's Award, and the status of patron of the former Huta Lenina steel works in Cracow, Poland.

Dr. Sendzimir's love for his native land never faded, and he continuously supported Polish endeavors in his adopted country, the United States. Most notably, he was a major financial and personal supporter of the Kosciuszko Foundation, the Polish Institute of Arts and Sciences, and Alliance College in Pennsylvania.

Huta im T. Sendzimir, the steel works in Cracow, Poland, was called Huta Lenina, after the Communist leader, following its construction in the 1950s. In 1990, when the Polish people rejected communism, the Polish government, which still presently owns the works, decided to give the complex a name reflecting Polish nationalism, pride, and genius. It selected Tadeusz Sendzimir as its namesake and invited the inventor's son, Michael Sendzimir, to be the works' patron, a position he still occupies.

The U.S. company, T. Sendzimir, Inc., was established by Dr. Sendzimir in the 1940s in Waterbury, Connecticut. It is run by Michael Sendzimir, President and CEO, and employs two of Michael's children: Tad Sendzimir, and Arri Sendzimir, both Vice Presidents. Development continues today with the latest option being a cassette of cluster rolls that can fit into a conventional 4-High mill, the diameter of the work roll at some 80 mm being approximately twice that of the Z-mill, thus enabling the rolling of softer materials to very thin gauges.

T. Sendzimir, Inc., has now been granted 96 patents and does not appear to be slowing down.

