

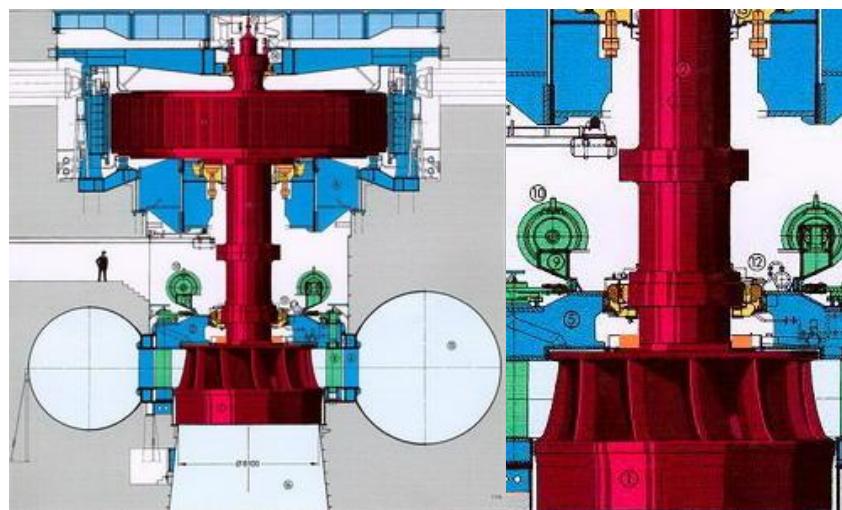


Maintenance: Ideas Factory



An assembly of a completely recovered gasket and the elastomer (white): two achievements of Itaipu.

The knowledge acquired since the moment Itaipu produced its first energy watt 24 years ago transformed the operation of the biggest hydroelectric power plant of the planet into an inexhaustible source of great ideas and economy for the company. Last week, another example turned up: another gasket from the generating units was recovered using technology and local manpower. The solution, which is literally erasing old problems related to gaskets, was exceeded by discovering a new material that reduces the risk of a machine breaking off due to water leak.



The gasket is located above the turbine wheel (in the picture the part is demonstrated in orange).

The gasket is a piece with just over four meters in diameter that surrounds the rotating shaft of a generating unit (as shown in the picture above). Divided by thirty electrographite-based segments (technically known as "carbon"), fixated into a

metal base, the gasket has the role of sealing the passage of the turbine water in its rotary and stationary parts.



A technician shows the eroded carbon segment: the wear is a common problem regarding the old material.

Over time, this carbon can be worn or simply unwind. The result: leaks, unit maintenance shutdown and extra expenses for the recovery of the part. "When this happened at first, the ring, even if partially or fully damaged, had all its set assembly recovered out of here, at an approximate cost of \$20,000", explains the mechanical engineer João Marra, Engineering Department of Mechanical Maintenance (SMIM.DT). "Not to mention the damage regarding the machine downtime for this replacement," he says.



João Marra (left), from SMIM.DT, and Francisco Marachi, from SMMU.DT: working together.

According to the engineer, for eight years the full or partial repair of the gasket has been done inside the company by the crew of the Department of Mechanical Maintenance of the Generating Units (SMMU.DT). The solution has significantly decreased the expenses, but did not solve the problem completely. As João Marra stated, it was necessary to find a material more effective than electro-graphite. The problem was that nobody knew anything better. In order not to give up on this idea, it was worth searching through everything and everywhere. Even on the Internet. And it was precisely the virtual world that, three years ago, indicated the correct path to the technicians of Itaipu.

The straps never get loose



Elastomer is very strong and it does not get distorted: flexibility ensures durability.

Using web search engines, João Marra found an innovating material developed by a Canadian company, Thordon Bearings. It was the thermoset polymeric elastomer - a type of rubber with a high level of elasticity (ability to return to its natural form and state without deteriorating). "It is not distorted nor is it loosened and it has no smell", teases the mechanical engineer João Marra, reproducing the known (and quite old) slogan of a sandals manufacturer.



At the front, Francisco Marachi and Miguel Armoa holding an old piece segment; behind, Marra, alone, shows the elastomer part, of much lighter material.

Itaipu's employees, along with Thordon Bearings' designers, developed a gasket made entirely of elastomer. It has been operating for three years at unit 14 and, after numerous tests, has never had any problems. "Given the excellent results, our last spare set has also been acquired in this material," states João Marra.



Elastomer gasket segment: the innovative material has been evaluated for three years and has been approved.

Thus, with rubber, the technicians of the binational company were able to cut back expenses and maintenance problems of the gaskets. "Besides being much stronger, the elastomer gasket has the same price of a carbon gasket", highlights João Marra. According to the engineer, it is very likely that the example set by Itaipu will be followed by other hydroelectric power plants.