OBJECTIVE

The aim was to develop a self supplied speed sensor. The choice was to design a tacho generator, with voltage and frequency proportional to the speed.

A contactless sensor has been developed and patented to measure the speed in a rotating cogwheel. This structure measures speed using variable reluctance principle.

This speed sensor concept has convinced automotive industry due to its good performances and other advantages. Since it is based on low number of parts, its price is compatible with the market expectations for this application.

STRUCTURE

The device's architecture is mainly composed of a rotor and a stator. The rotor is a cogwheel obviously turning at the speed you want to measure. The stator is composed of magnets in order to produce the magnetic flux in the device.

When the cogwheel rotates, because of the tooth on stator and rotor, the device's reluctance changes and creates a flux variation which induces an alternative voltage at the terminals of the coil. Rotor speed determines the signal frequency. The faster the rotor revolves, the higher the frequency.

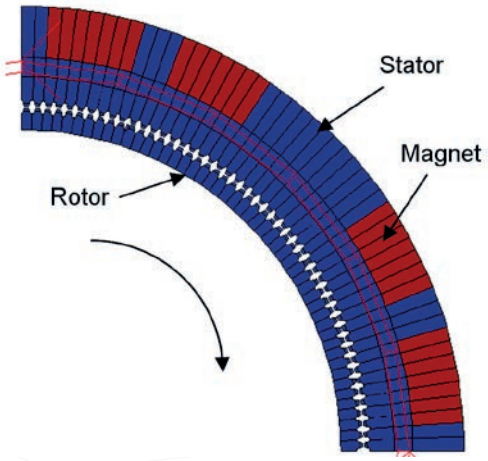

Fig. 1: Speed sensor mechanical design

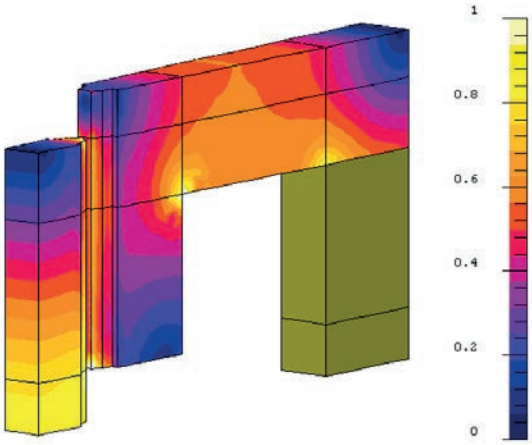

Fig. 3: Isovalues of induction

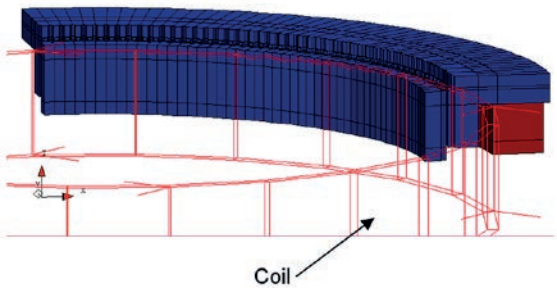

Fig. 2: Speed sensor mechanical design

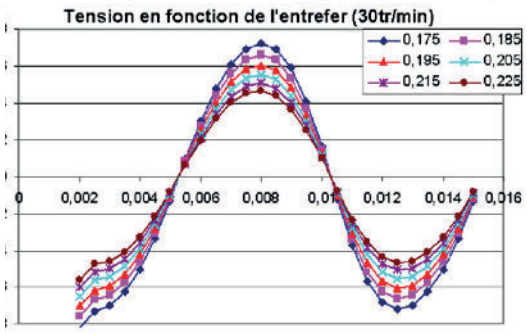

Fig. 4: Voltage vs airgap

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PERFORMANCE

CHARACTERISTICS	UNIT	VALUES
Material		Magnetic steel
Work Frequency	kHz	0.1 to 10
Speed	RPM	30 to 3000
Voltage	Vpp	1.5 to 30
Load	kΩ	3
Resistance windings	Ω	400 to 500

Fig. 5: Frame with rotor and stator

Fig. 6: Shaft with rotor and bearing

APPLICATIONS

This sensor finds applications for classical speed measurement in automotive and aeronautic industries. Moreover, as this measuring device is also a generator, it allows to combine contactless speed measurement an the supply of high level electronics (other sensors as force sensors, accelerometers, strain gauges, signal treatment and conditioners, RF transmissions ...) on rotating machine output shaft in very large number of applications: Manufacturing machines, Machine tools, Electric motors, Spindle ...