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INTRODUCTION

CEDRAT TECHNOLOGIES proposes new patented cost effective contact less sensors. The concept is so modular and versatile that customized OEM products can be rapidly developed.

CEDRAT TECHNOLOGIES offers an innovative solution for contactless torque measurement. The concept is based on the use of a torsion converter and a proximity sensor. The nominal sensing solution relies on a new PCB based Eddy Current Sensor (ECS) developed by CEDRAT TECHNOLOGIES. The contactless torque sensor (CTS) can be provided with a digital signal processing software and a compatible electronic card.

Fig. 1: Overview of a hollow shaft contactless

ADVANTAGES

- Cost-effective modular approach
- Ease of integration
- Solid state design
- Stationary axle or rotating shaft
- Working in harsh environment (dust or sand, oil, water)
- Reliable measurement
- Compatibility with all types of shaft materials
- Possible torque measurement at zero speed
- Angle and speed measurement (options)

Fig. 2: Customized CTS sensor with shaft.

APPLICATIONS

- Production Process Monitoring
- Power plants
- Wind-electric power stations
- Automotive (steering, gearing...)
- Drilling systems
- Textile machines
- Mechanical conveying technology
- Household appliances
- Step-Over Electric Bikes
- And much more

CONCEPT

A torque applied on a shaft naturally generates a torsion deformation of the shaft. The CTS is designed to measure this torsion. This measurement is performed by 2 sub systems:

› The torsion converter: it is an elastic body fixed on the shaft. The converter transforms torsion deformation into linear displacement detected by a proximity sensor (Fig.3). In another terms, the converter (Fig.4) transforms angular shift into significant axial shifts of two targets in a direction along the shaft axis. The torsion converter can include a shaft (Fig. 1) or be located onto an existing shaft (Fig.2). The shaft can be a stationary axle or a rotating shaft.

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› A proximity sensor: located in front of the targets, the proximity sensor detect the target linear motions and provide a signal image of the applied torque. Several types of proximity sensors can be used. Nominal solution proposed by CEDRAT TECHNOLOGIES consists in new cost effective PCB-based ECS probes combined with the ECS75 electronics card designed by CEDRAT TECHNOLOGIES (Fig.5).

The speed and angle can also be proposed as options without any additional components.

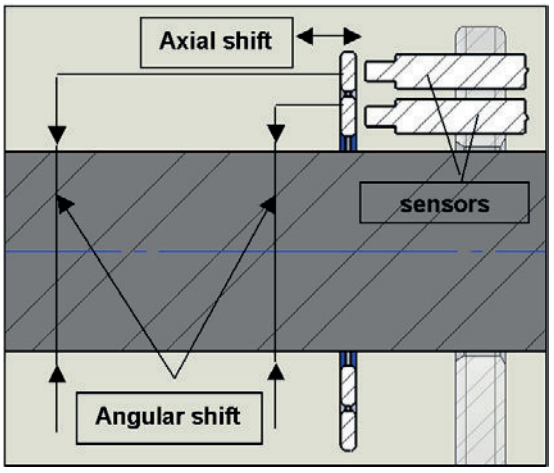

Fig. 3: Contactless Torque Sensor principle.

REFERENCE	UNIT	CTS1	CTS10	CTS500
Measurement range	N.m	0...1	0...10	0...50
Speed	Rpm	3000		
Resolution	%	0.1 % Full scale		
Accuracy	%	2 %		
Repeatability	%	2 %		
Bandwidth	Hz	Up to 2000		
Operating temperature	°C	[0 ; 70]		
Output	V(DC)	±10 V		
Dimensions	mm^3	Ø30x30mm	Ø65x50mm	Ø130x100mm
Nominal shaft diameter	mm	Ø 5mm	Ø 15mm	Ø 40mm

Table 1: : Preliminary characteristics of the Contactless Torque Sensor

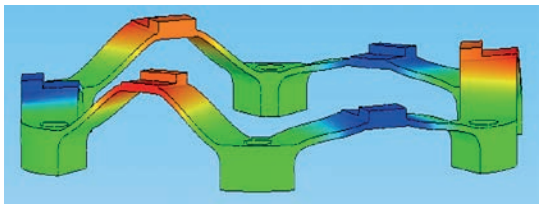

Fig. 5: Converter principle

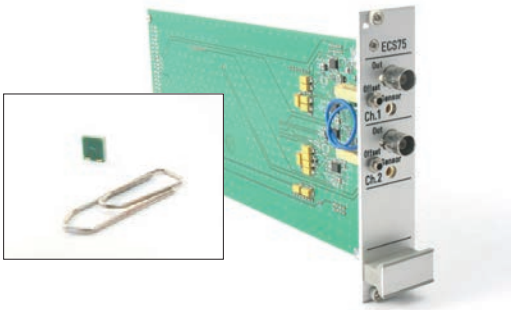

Fig. 4: ECS sensor on PCB and ECS75 electronic conditioner card

COLLABORATION

CEDRAT TECHNOLOGIES has developed the initial CTS sensor for PSA Peugeot Citroën for automotive applications. New developments of CTS are performed for high precision compact robot joints in for the MANUMET Smart Joint project, which is an European Union Co-funded project and in the COTS project with CETIM and UTC.