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**Objective**: Develop a *portable device* to measure *Gap&Flush* on *tailgate, rear glass, chromed components* and *rear headlights* of T-ROC model in the assembly line to *reduce operator interventions (reworking)* 

1. Target uncertainty: < 0.5mm

2. Measure on **very different surfaces** (reflective/translucent/transparent)

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3. Device **portability** 



#### MAN IN THE LOOP

- Operator safety
- Uncertainty balance (higher difficulties in reaching a target uncertainty < 0.5mm)</li>
- Ergonomicity





- •Portable devices are commercially available
- •Not every commercial device can measure on transparent/translucent materials
- •Devices typically work with a contact probe
- •The measurement area is not automatically recognized by the device

#### Target Markets

AutomotiveAerospaceHome Appliances









#### Smart-phone based optical triangulation device

- Hybrid contact/non-contact operating mode (<40mm target-to-device distance)</li>
- Multi-material measurement capability (optimized laser wavelength)
- Automated measurement area recognition
  - Conditional switch on/off of laser source (higher safety for the operator)
  - Exposure time adjustment based on target recognition
- Feedback to the operator with respect to measurement accuracy
- Wi-fi based data transmission via OPC-UA protocol



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From concept...



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...to the device (Hardware)



- Web-service managing hardware (cameras, distance sensor, etc.) and software resources (e.g. automated recognition of measurement area)
- Synchronous configuration of all devices via REST service
- Local/global storage of data using SQL database engine
- OPC-UA based data communication
- Easy set-up in robotized applications





...to the device (Software)









#### IPR

ITA Patent File Number: 10201800003247Filing Date:02/03/2018Positive Patent report:11/07/2018

PCT Patent File Number:PCT/IB2019/051662 Filing Date: 01/03/2019

#### Time to market

Current status: TRL 7 (daily use in Volkswagen Autoeuropa - PT)

Engineering needs to get to TRL 9 (e.g. use of hardware compliant to industrial needs)



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#### Prior art

1

- Reference is made to the following documents:
  - D1 EP 2 423 639 A1
    - D2 US 5 416 590 A
    - D3 FRANZEN B ET AL: "ROBOTERAUGEN VERMESSEN BERÜHRUNGSLOS KAROSSERIE-SPALTEN

#### Technical field

2 The application relates to measuring gap and/or flush between two surfaces.

#### Novelty and inventive step

- 3 The subject-matter of **claim 1** is novel, because none of the documents **D1-D3** disclose a distance sensor.
- The subject-matter of **claim 1** involves an inventive step.



#### The Team

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