

## Deliverable D1

### Title

Roadmap detailing the future requirements for improved force transfer standards and associated calibration methods for force testing machines taking into account realistic uncertainties

### EMPIR Grant Agreement number

18SIB08



### Project short name

ComTraForce



### Leading partner

Andy Knott (NPL)

### Due date

31.08.2020

### Submission date

16.05.2022

A technology roadmap has been developed detailing the future requirements for improved force transfer standards and associated calibration methods for force testing machines taking into account realistic uncertainties. The results from A1.1.5 (report on the evaluation of material testing machines capabilities and force calibration infrastructure) and A1.2.3 (evaluation of the range of test machine operating parameters) and the input from the stakeholder committee, as well as the first stakeholder workshop, has been used to develop this technology roadmap.

This roadmap is given on the next page.

Deliverable D1 is successfully completed as per Annex 1.

### Drivers & Benefits

#### 1. General Industry

Provide traceable dynamic (continuous, sinusoidal, and shock) force standards incorporating uncertainty for all areas of industry

#### 2. Materials Testing

Provide traceability to the SI for dynamic force and strain to improve accuracy in the area of materials testing

### Targets

Improved testing machine verification / calibration (time influence)

Calibration infrastructure for piezoelectric force transducers

Traceability & uncertainty (< 0.5 %) for fatigue machines, including resonance ones

Traceability for high-frequency industrial applications e.g. automotive crash testing, acoustics, fatigue testing

### Deliverables

Develop explicit procedures / uncertainty model for low frequency structural testing

Clearly defined continuous / dynamic force machine verification procedures

Better guidance on machine / specimen alignment

Guidance on effects of alignment and temperature on continuous/dynamic machine calibration

Develop standardised traceability path for medium/high frequency dynamic testing using common commercial adaptors / transducers

### Technologies

Continuous measurement characterisation

Characterisation of alignment effects

Characterisation of temperature effects

Dynamic extensometry standards

Dynamic temperature measurement

### Enabling Science

Traceable static force measurements

Timeline:

2020

2021

2022

2023

2024

2025

The content presented was developed within the framework of the EU-funded project ComTraForce "*Comprehensive traceability for force metrology services*" with the support of international partners from science and industry.



<https://www.ptb.de/empir2019/comtraforce>



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