



HAL
open science

PROPOSITION OF AN INTERIM STANDARDIZED TEST FOR ARTICULATED ARM COORDINATE MEASURUNG MACHINE

El Asmai Salma, François Hennebelle, Jean-François Fontaine

► **To cite this version:**

El Asmai Salma, François Hennebelle, Jean-François Fontaine. PROPOSITION OF AN INTERIM STANDARDIZED TEST FOR ARTICULATED ARM COORDINATE MEASURUNG MACHINE. 3D Metrology Conference (3DMC), 2018, Hambourg, Germany. hal-01988711

HAL Id: hal-01988711

<https://hal.science/hal-01988711>

Submitted on 21 Jan 2019

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

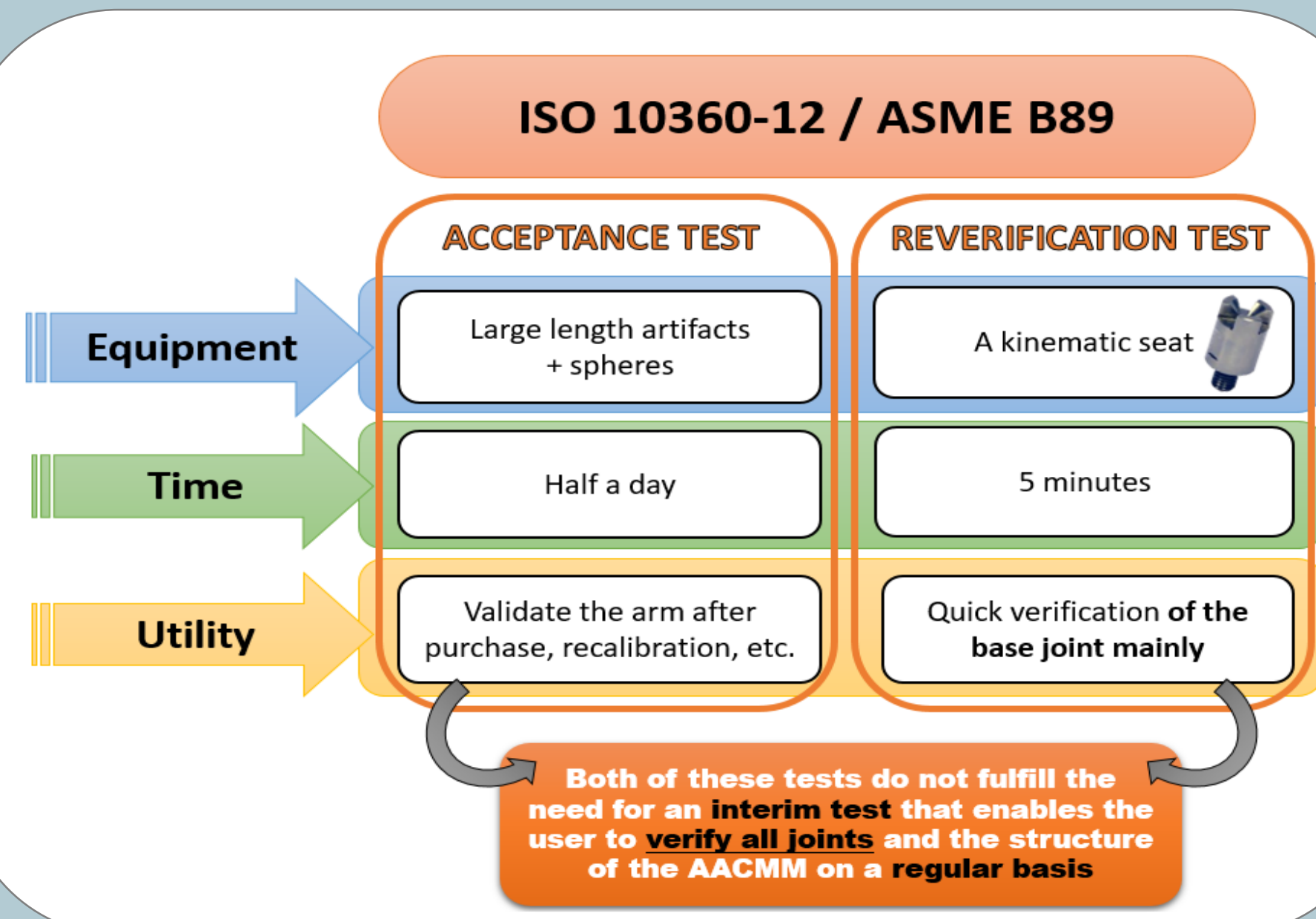
PROPOSITION OF AN INTERIM STANDARDIZED TEST FOR ARTICULATED ARM COORDINATE MEASURING MACHINE

El Asmai Salma, François Hennebelle, Jean-François Fontaine
University of Burgundy, France



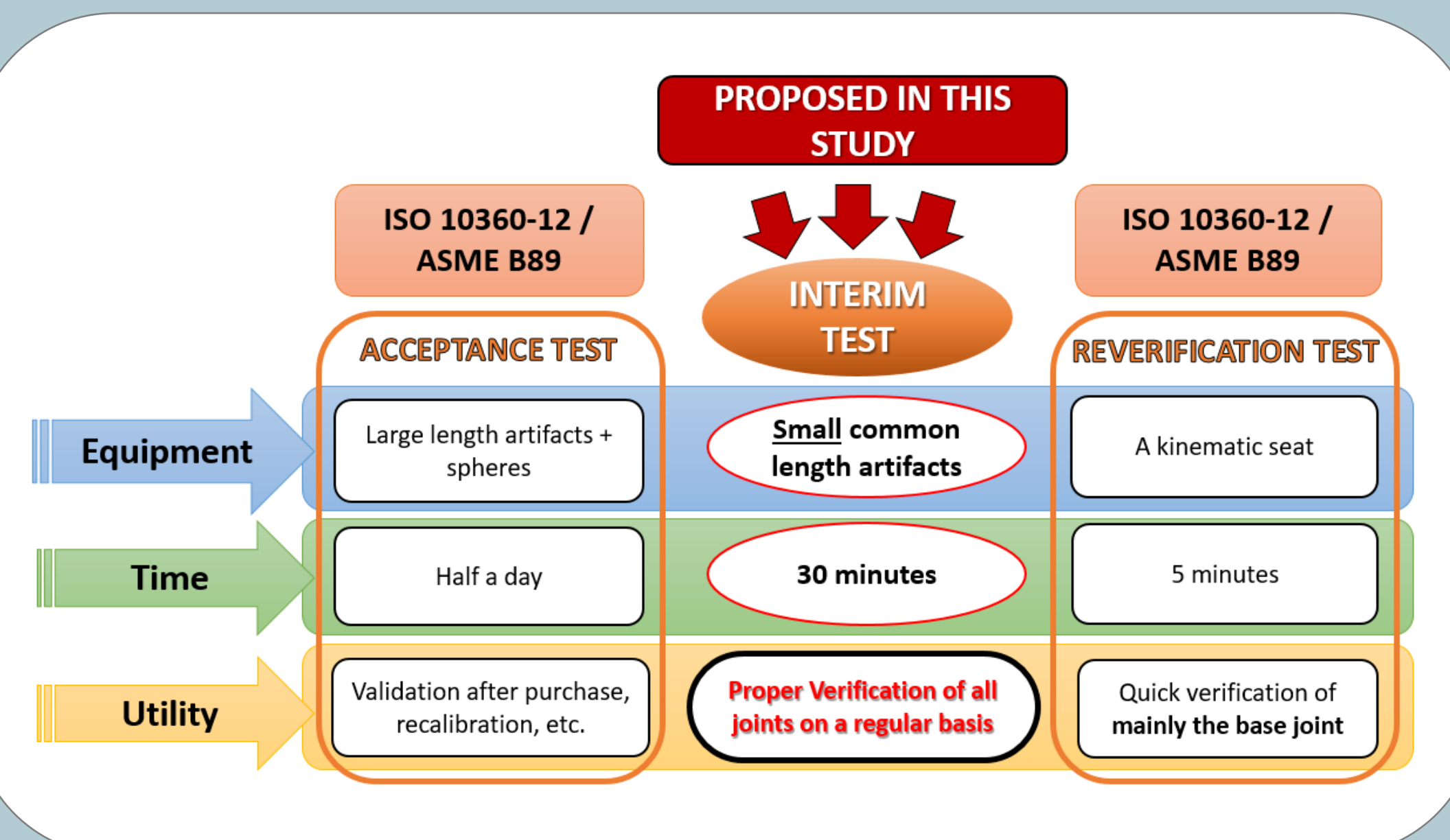
INTRODUCTION

CONTEXT : Limits of existing AACMM standards and the need for an interim test



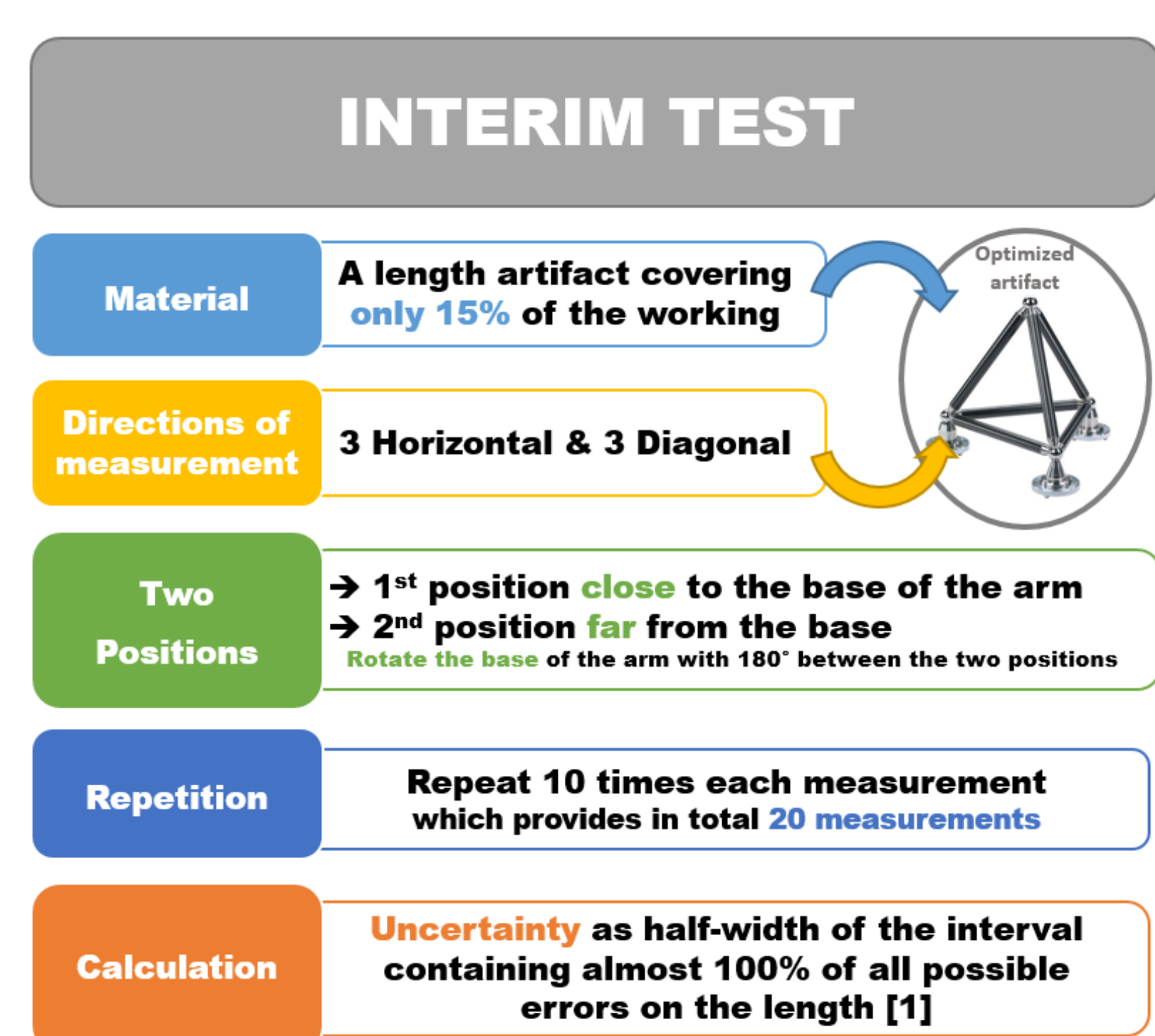
PURPOSE OF THE STUDY

- Propose an interim test that verifies all the encoders.
- Study the possibility of optimizing the volumetric acceptance test of ISO 10360-12.



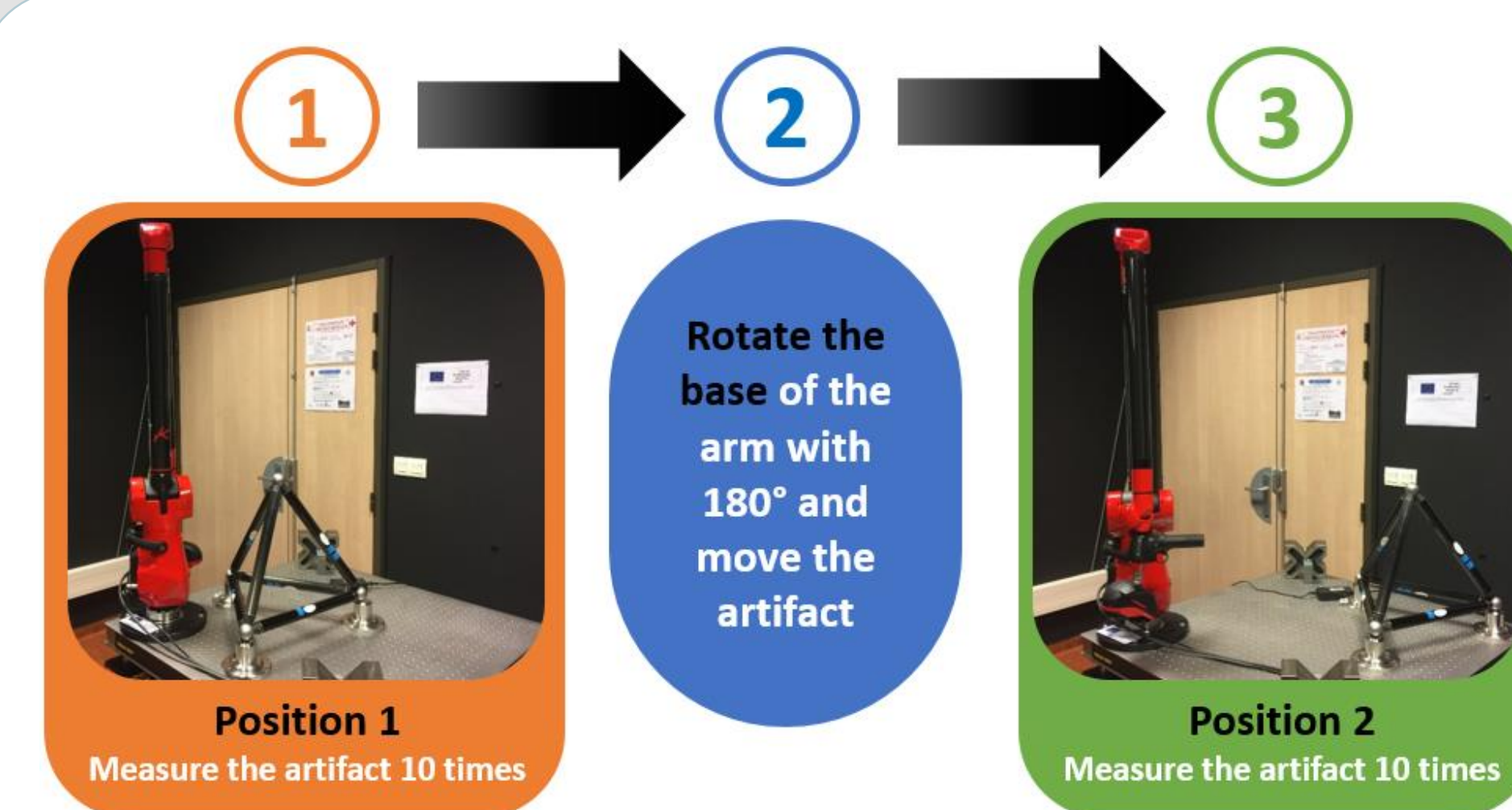
PROPOSED INTERIM TEST

DESCRIPTION OF THE INTERIM TEST

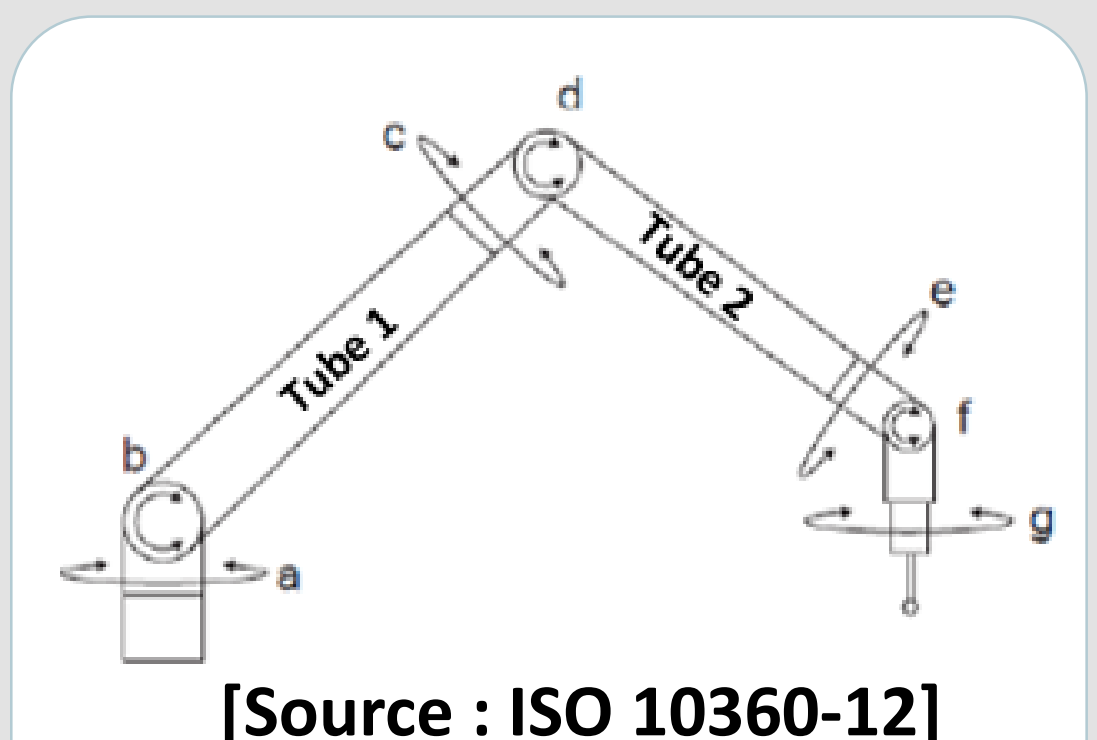


Note: The recommendations concerning the repetition and calculation were detailed in [1] and the recommendations concerning the length of the small artifact and the directions of measurement will be detailed in our coming work.

ILLUSTRATION OF THE INTERIM TEST



STRUCTURE OF A 7 AXES AACMM



[Source : ISO 10360-12]
Note: The user should move as much as possible all the joints during the test.

PERFORMANCE OF THE INTERIM TEST

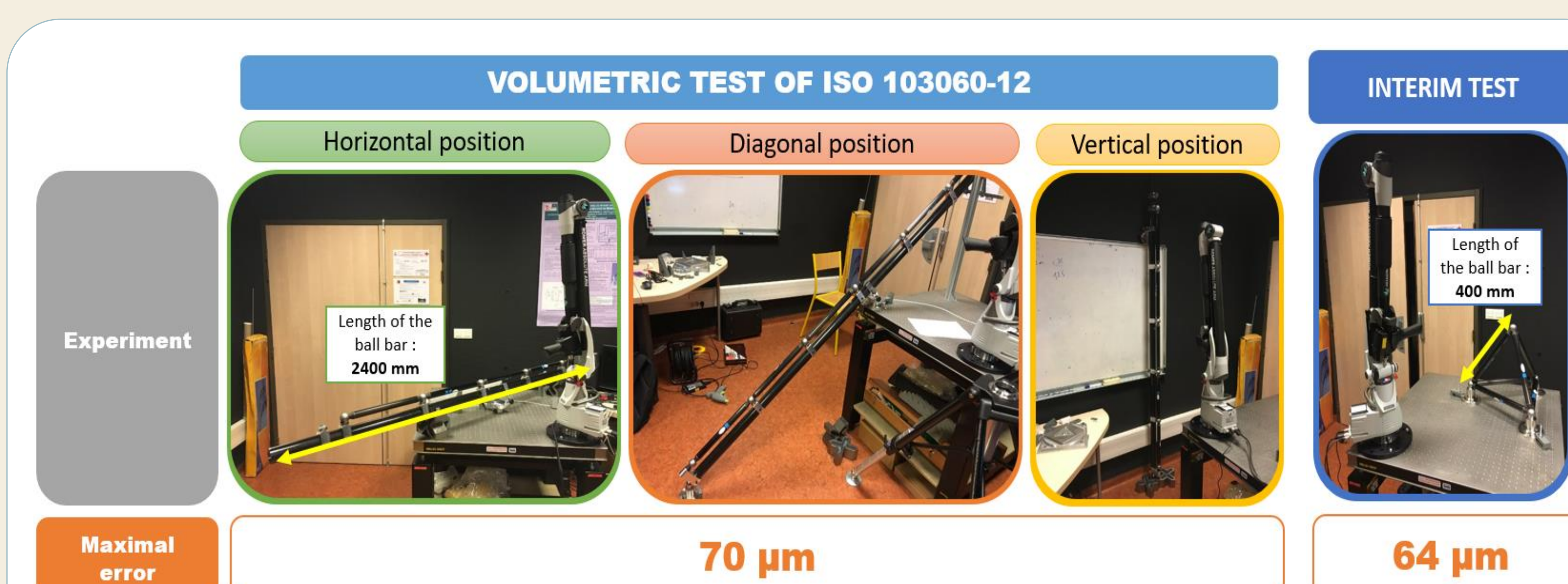
Joints rotation		Mechanical deformation	
Joint	a b c d e f g	Deformation (Indicative values)	Tube 1 Tube 2
Covered Angle (%)	89 86 96 88 79 89 93	Bending [µm/m]	15 4
		Torsion [µrad]	40 20
Robustness		Coefficient of Variation ~ 20%	

The test captures sufficiently all the encoder errors and the deformation of the arm and lasts for only 30 minutes

Test highly adapted to regular verification in industrial applications

ISO 10360-12 OPTIMIZATION ?

COMPARISON OF THE ISO 10360-12 VOLUMETRIC TEST WITH THE PROPOSED INTERIM TEST



Arguments of the possibility of optimization of ISO 10360-12

1/ The closeness of the performance of the ISO 10360-12 volumetric test and the interim test

2/ The possibility of calibration of an AACMM with measurements located in a small area [2]

PERSPECTIVES

- Comparison of the AACMM mechanical deformation during the ISO 10360-12 test and the interim test.
- Study the possibility of calibration of an AACMM with the proposed interim test, or a similar test (study already engaged).

REFERENCES

- [1] El Asmai S, Hennebelle F, Coorevits T, Vincent R and Fontaine J-F 2018 Rapid and robust on-site evaluation of articulated arm coordinate measuring machine performance *Meas. Sci. Technol.*
- [2] Dupuis J, Holst C and Kuhlmann H 2017 Improving the kinematic calibration of a coordinate measuring arm using configuration *analysis Precis. Eng.* 50 171-82