

Irish Standard I.S. EN ISO 20685-2:2017

Ergonomics - 3-D scanning methodologies for internationally compatible anthropometric databases - Part 2: Evaluation protocol of surface shape and repeatability of relative landmark positions (ISO 20685-2:2015)

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National Foreword

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EUROPEAN STANDARD NORME EUROPÉENNE

EN ISO 20685-2

EUROPÄISCHE NORM

March 2017

ICS 13.180

English Version

Ergonomics - 3-D scanning methodologies for internationally compatible anthropometric databases -Part 2: Evaluation protocol of surface shape and repeatability of relative landmark positions (ISO 20685-2:2015)

Ergonomie - Méthodologies d'exploration tridimensionnelles pour les bases de données anthropométriques compatibles au plan international -Partie 2: Protocole d'évaluation de la forme extérieure et de la répétabilité des positions relatives de repères (ISO 20685-2:2015) Ergonomie - Scanverfahren für international kompatible anthropometrische Datenbanken - Teil 2: Prüfprotokoll für Körperoberflächen und Wiederholbarkeit relativer Messpunktpositionen (ISO 20685-2:2015)

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EN ISO 20685-2:2017 (E)

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European foreword

The text of ISO 20685-2:2015 has been prepared by Technical Committee ISO/TC 159 "Ergonomics" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 20685-2:2017 by Technical Committee CEN/TC 122 "Ergonomics" the secretariat of which is held by DIN.

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INTERNATIONAL STANDARD

ISO 20685-2

First edition 2015-08-01

Ergonomics — 3-D scanning methodologies for internationally compatible anthropometric databases —

Part 2: Evaluation protocol of surface shape and repeatability of relative landmark positions

Ergonomie — Méthodologies d'exploration tridimensionnelles pour les bases de données anthropométriques compatibles au plan international —

Partie 2: Protocole d'évaluation de la forme extérieure et de la répétabilité des positions relatives de repères



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 159, *Ergonomics*, Subcommittee SC 3, *Anthropometry and biomechanics*.

ISO 20685 consists of the following parts, under the general title *3-D scanning methodologies for internationally compatible anthropometric databases*:

— Part 2: Evaluation protocol of surface shape and repeatability of relative landmark positions

A revision of ISO 20685:2010 is under preparation; when revised, it will become

— Part 1: Evaluation protocol for body dimensions extracted from 3-D body scans

Introduction

Anthropometric measures are key to many International Standards. These measures can be gathered using a variety of instruments. An instrument with relatively new application to anthropometry is a three-dimensional (3-D) scanner. 3-D scanners generate a 3-D point cloud of the outside of the human body that can be used in a number of situations including clothing and automotive design, engineering and medical applications. Recently, digital human models are created from a 3-D point cloud, and used for various applications related to technological design process. Quality control of scan-extracted anthropometric data is important since required quality can differ according to applications.

There are a number of different fundamental technologies that underlie commercially available systems. These include stereophotogrammetry, ultrasound and light (laser light, white light and infrared), among others. Further, the software that is available to process data from the scan varies in its methods. Additionally, methods to extract landmark positions are different between commercially available systems. In some systems, anthropometrists decide landmark locations and paste marker stickers, and scanner system calculate locations of marker stickers and identify their names, while in other systems, landmark positions are automatically calculated from the surface shape data. Quality of landmark locations have significant effects on the quality of scan-extracted 1-D measurements as well as digital human models created based on these landmarks.

As a result of differences in fundamental technology, hardware and software, the quality of body surface shape and landmark locations from several different systems can be different for the same individual. Since 3-D scanning can be used to gather these data, it was important to develop an International Standard that allows users of such systems as well as users of scan-extracted measurements to judge whether the 3-D system is adequate for these needs.

The intent of this part of ISO 20685 is to ensure the quality control process of body scanners, especially that of surface shape and locations of landmarks as specified by ISO 7250-1.

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Ergonomics — 3-D scanning methodologies for internationally compatible anthropometric databases —

Part 2: Evaluation protocol of surface shape and repeatability of relative landmark positions

1 Scope

This part of ISO 20685 addresses protocols for testing of 3-D surface-scanning systems in the acquisition of human body shape data and measurements. It does not apply to instruments that measure the motion of individual landmarks.

While mainly concerned with whole-body scanners, it is also applicable to body-segment scanners (head scanners, hand scanners, foot scanners). This International Standard applies to body scanners that measure the human body in a single view. When a hand-held scanner is evaluated, it has to be noted that the human operator can contribute to the overall error. When systems are evaluated in which the subject is rotated, movement artefacts can be introduced; these can also contribute to the overall error. This part of ISO 20685 applies to the landmark positions determined by an anthropometrist. It does not apply to landmark positions automatically calculated by software from the point cloud.

The quality of surface shape of the human body and landmark positions is influenced by performance of scanner systems and humans including measurers and subjects. This part of ISO 20685 addresses the performance of scanner systems by using artefacts rather than human subjects as test objects.

Traditional instruments are required to be accurate to millimetre. Their accuracy can be verified by comparing the instrument with a scale calibrated according to an international standard of length. To verify or specify the accuracy of body scanners, a calibrated test object with known form and size is used.

The intended audience is those who use 3-D body scanners to create 3-D anthropometric databases including 3-D landmark locations, the users of these data, and scanner designers and manufacturers. This part of ISO 20685 intends to provide the basis for the agreement on the performance of body scanners between scanner users and scanner providers as well as between 3-D anthropometric database providers and data users.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7250-1, Basic human body measurements for technological design — Part 1: Body measurement definitions and landmarks

ISO 10360-8, Geometrical product specifications (GPS) — Acceptance and reverification tests for coordinate measuring systems (CMS) — Part 8: CMMs with optical distance sensors

ISO 20685, 3-D scanning methodologies for internationally compatible anthropometric databases

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.



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