

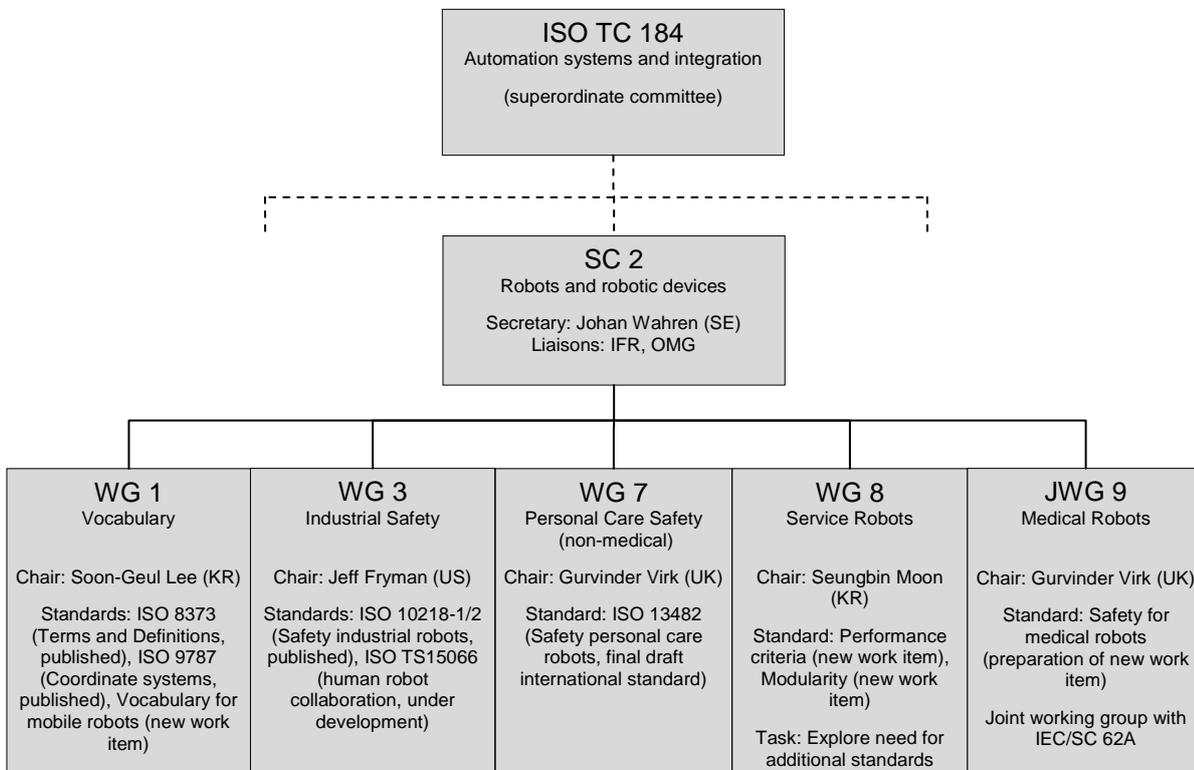
Standardisation Efforts on Industrial and Service Robots

Industrial robots are more and more performing tasks in collaboration with humans in flexible and reconfigurable working environments in manufacturing and beyond. In order to address the challenge of designing safety critical robot systems, ISO safety standards such as ISO 10218 have been regularly updated and extended in the last years. New standardisation efforts have also been started on service robots for medical and household applications in order to specify general safety requirements before serial products enter the market. Apart from safety other standardization efforts focus on the harmonization of terminology and the interchangeability of robot components.

Within the EU-funded Coordination Action RockEU, standardisation efforts on robot safety are to be promoted and effectively communicated. Specifically with this series of newsletters EU robotics stakeholders shall be informed about current developments in ISO standardisation committee TC 184/SC 2 “Robots and robotic devices”. Also, working groups of the relevant ISO Technical Committee TC 184 “Automation systems and integration” are open for contributors. Experts are explicitly encouraged to participate.¹

Organisation of Standardisation Committees

All standard development related to robots takes place in ISO TC 184/SC 2 committee and is organized in five working groups (see figure below). During the year 2012, a study group on modular robot design was founded inside WG 8.



¹ For more information regarding possible participation in TC 184/SC 2, please contact: theo.jacobs@ipa.fraunhofer.de

Standardization Newsletter

Generally, ISO standards are developed through the instrument of “commenting”: During balloting periods, which are held regularly, each national standardization organization has the possibility to write comments proposing to change, delete or add text, graphics etc. to the standard. In the international meetings these comments are resolved in discussion and agreed changes are applied to the document.

Nations that are currently actively participating in developing these standards are: China, France, Germany, Italy, Japan, Korea and United Kingdom. WG 3 gets additional contributions from Canada, Sweden, Switzerland and the United States. The working groups usually meet three times a year in different locations in the USA, Europe and Asia. Meetings of the SC 2 committee are held every two years.

Further information is available at the ISO Website² and the committee website³.

Progress in WG 1 – Vocabulary and coordinate systems

Chair: Soon-Geul Lee (Korea)

- Standards:
- ISO 8373 – Robots and robotic devices – Vocabulary (published)
 - ISO 9787 – Robots and robotic devices – Coordinate systems and motion nomenclatures (published)
 - Robots and robotic devices – Vocabulary for mobile robots (new work item)

In the last years, WG 1 has published ISO 8373, a standard for terminology for robots in general and ISO 9787, a standard for the definition of coordinate systems.

Currently, a standard with terms and definitions in the field of robot mobility is in preparation which will comprise vocabulary for wheeled, tracked and legged mobile service robots, containing e.g. definitions for the turning radius of a robot as well as various locomotion planning methods. Further standards dealing e.g. with terminology for other main skills of a service robot such as perception or navigation and planning may follow in the next years.

Progress in WG 3 – Industrial safety

Chair: Jeff Fryman (USA)

- Standards:
- ISO 10218-1 – Robots for industrial environments – Safety requirements – Part 1: Robot (published in 2011)
 - ISO 10218-2 – Robots for industrial environments – Safety requirements – Part 1: Industrial robot system and integration (published in 2011)
 - ISO/TS 15066 – Technical specification on collaborative workspace (under elaboration)

In WG 3 work on the technical specification ISO/TS 15066 continued. The technical specification contains limits for impact forces and pressures which might lead to an injury in case of collisions. Values are taken from medical literature as well as from practical tests on pain tolerance levels. Currently, the standard is consolidated and supplemented with the results of further practical tests that have been conducted in the meantime.

Progress in WG 7 – Personal Care Safety

Chair: Gurvinder Virk (UK)

- Standards:
- ISO 13482 – Robots and robotic devices – Safety requirements for service robots – Personal care robot (publication in February 2014)
 - Application guide for ISO 13482 to be published as a technical report (new work item)
 - Validation criteria for personal care robots (new work item)

² http://www.iso.org/iso/standards_development/technical_committees/other_bodies/iso_technical_committee.htm?commid=54138

³ www.robotstandardisation.org

Standardization Newsletter

After five years development time, ISO 13482, the first safety standard for “personal care robots” has finally been approved for publication. Parallel balloting is also underway to harmonize the ISO 13482 safety standard with the European Machinery Directive. The standard will presumably be available in February 2014.

In the future, WG 7 will work on other standardisation items related to personal care robot safety. In the last international meeting in Bristol (UK) in June 2013, material for a new work item on verification and validation tests for personal care robots was discussed. In addition, the publication of a guide to ISO 13482 is planned with examples on how to perform risk assessment for autonomous mobile robots.

Progress in WG 8 – Service robots

Chair: Seungbin Moon (Korea)

Task: Determine need for additional standards for service robots

Standards:

- ISO 18646-1 – Robots and robotic devices - Performance criteria and related test methods for service robot – Part 1: Locomotion for wheeled robot
- Modularity

In order to allow customers to easily compare the capabilities of different robots, WG 8 has started the development of a standard for measuring performance. The current early draft includes instructions to measure speed, braking distance, climbing ability, etc. For each item the setup, conduction and evaluation of tests are defined. Further material will be added in the future.

In 2012, a study group was founded inside WG 8 to evaluate the need for a new standard for service robot modularity. At the International Conference on Robotics and Automation (ICRA) in Karlsruhe in May 2013, a workshop was organized to get input from the international robotics community. In the future, more material will be gathered by the study group with the aim to form a new working group in the future.

Progress in JWG 9 – Medical robot safety

Chair: Gurvinder Virk (UK)

Standard: IEC 60601-2-x (Evaluation of new work item)

JWG 9 is a Joint Working Group in cooperation with IEC/SC 62A. For a time of several years, the working group has evaluated initial concepts for a new standard on the safety of medical robots which will be added as a part of IEC 60601-2. The outcomes include a definition for the autonomy of medical devices as well as further differentiation between medical robots and service robots or personal care robots.

Possibilities to get involved in standardization work

For the European academia/research and industry it is crucial to participate in all standardization working groups with a sufficient number of technical experts. Only by doing so, innovations and products will be considered during the standardization process and latest research results can be incorporated in the standard.

Encouragement to attend international meetings

Technical experts who attend international meetings, vote in international balloting procedures and write comments to propose changes in the documents are appointed by the national standardization organization of their respective country. In order to get nominated, interested persons from industry or research institutes should contact their national standardization body to ask for details. Apart from formal contribution as a technical expert, it is also possible to visit a meeting as an observer.

Standardization Newsletter

Observers are also formally appointed by national standardization organizations, but do not have the right to participate in official balloting.

The next international meetings are planned as follows:

- February 12 – 21, 2013: Subsequent meetings of WG 1, 7, 8 and JWG 9 in San Sebastian, Spain
- February 24 – 26, 2013: Meeting of WG 3 in Orlando, Florida, USA
- June 23 – 27, 2013: Subsequent meetings of WG 1, 7, 8 and JWG 9 in Washington D.C., USA

Contributing to national mirror committees

When several experts from one country participate in standardisation, a national mirror committee can be formed. In these national committees homework and comments for the international meetings are coordinated and results from the international meetings are disseminated to the national community. Even if no mirror committee has been formed yet, it is possible for interested technical experts to contribute to standardization on a national level without attending the international meetings, for example by making comments for an international balloting.

Benefit from travel cost subvention

The EU-funded coordination action RockEU has the possibility to reimburse travel costs (within certain limits) to an international meeting for interested first-time visitors from a European country. If you are interested to join an international meeting, please contact Theo Jacobs (theo.jacobs@ipa.fraunhofer.de). It is obvious that only a long term engagement in these standardization efforts is beneficial for the WG or the participants.

Compiled and written by

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<http://www.eurobotics-project.eu>