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ISO/TC 299 WG3 SUMMARY...

- ISO/TC 299 = Robots
 - 27 members (countries) of TC 299.
- WG3 is industrial (sector, environment), which is well established...
 - 18 ACTIVE countries (at in-person meetings).
 - 60 attendees total max at meetings (limit due to room capacity), maximum of 6 attendees per country.
 - 145 members of WG3.
- 11 publications (standards, technical specifications, technical reports).
- Safety standards have been highly accepted and broadly adopted in:
 - Europe (all countries)
 - Japan, Korea,
 - Brazil
 - Possibly other countries...

WG3 – ROBOTICS, INDUSTRIAL...

Title Robotics – Industrial safety

Scope Safety standards & safety guidance for robots and robot systems, fixed in place or mobile...

- For use in an industrial environment, e.g., workplaces (indoors or outdoors), in factories, stores, food preparation/cooking, ...
 - ❖ With trained personnel that work with the machinery and,
 - ❖ Where the public is either excluded or restricted from access.
- For industrial applications:
automation, assembly, handling, processing, storage, warehousing and logistics.

Users are typically subject to workplace health and safety regulations.

Users are not considered "consumers" or "patients".

WG3 will handle standards/Ts/TRs as assigned by TC299, e.g., industrial robot performance standards that are legacy from a disbanded WG from TC184.

- Excludes**
- Toys, driverless industrial trucks, industrial trucks (with drivers), public road vehicles, commercial aircraft, military, law enforcement
 - That which is covered by TC23 Agricultural machinery
 - Personal care robots and Service robots,
 - Medical robots/ applications

WG3 PROJECTS

Title Robotics – Industrial safety

Projects ISO 10218-1:2011, *Robots & robotic devices – Safety requirements for industrial robots – Part 1: Robots (under revision)*
ISO 10218-2:2011, *Robots and robotic devices – Safety requirements for industrial robots – Part 2: Robot systems and integration (under revision)*
ISO/TS 15066:2016, *Robots and robotic devices – Collaborative robots*
ISO/TR 20218-1:2019, *Robotics – Safety requirements for ind robots – Part 1: Ind robot system end-effector*
ISO/TR 20218-2:2017, *Robotics – Safety requirements for ind robots – Part 2: Manual load/ unload stations*

Non-safety standards assigned by TC299, developed by a disbanded WG under TC184

ISO 11593:1996, *Manipulating industrial robots – Automatic end-effector exchange systems – Vocabulary and presentation of characteristics (under revision)*
ISO 9283:1998, *Manipulating industrial robots – Performance criteria and related test methods*
ISO 9401-1:2004, *Manipulating industrial robots – Mechanical interfaces – Part 1: Plates*
ISO 9401-2:2002, *Manipulating industrial robots – Mechanical interfaces – Part 2: Shafts*
ISO 9946:1998, *Manipulating industrial robots – Presentation of characteristics*
ISO 14539:2000, *Manipulating industrial robots – Object handling with grasp-type grippers – Vocabulary and presentation of characteristics*

HOW DOES ISO/TC 299 WG3 DEFINE TERMINOLOGY?

- In the beginning...
 - Started with the definitions from RIA and ANSI RIA R15.06
 - From there, WG3 developed definitions for its own use...
- After WG1 (terminology) started, we tried to use their definitions...
 - Over time, a divide has occurred...
 - Now WG1 terminology is different than what WG3 (industrial) needs.
 - The WG3 modifications are not as technically exact as ISO 8372, but WG3 definitions are representative and easily understood user terminology
 - WG3 is NOW using...
 - ISO 8373, if applicable, OR
 - ISO Online Browsing Database (<https://www.iso.org/obp/ui#home>), OR
 - Developing own definitions (to be in the words of our constituents who are NOT in academia or research).

DEFINITIONS OF ROBOT, AUTOMATED ROBOT, TELEOPERATED ROBOT?

ROBOT... became INDUSTRIAL ROBOT with service robot standardization...

→ automatically controlled, reprogrammable multipurpose manipulator, programmable in three or more axes, which can be either fixed in place or mobile for use in industrial automation applications

Note 1 to entry: This includes any integrated additional axes.

Note 2 to entry: The industrial robot includes the manipulator, including actuators; the controller, including teach pendant and any communication interface (hardware & software).

Note 3 to entry: **Adapted** from ISO 8373.

Note 4 to entry: The following devices are considered industrial robots for the purpose of this part of ISO 10218...

RNS NOTE: Does NOT include an end-effector

AUTOMATED ROBOT... *Not defined or used, after all WG3 defines robot/ industrial robot as automatically controlled, reprogrammable...*

TELEOPERATED ROBOT... *Not defined or used by WG3, it is simply remote programming or remote operation...*

DEFINITIONS OF ENVIRONMENT, POSE?

ENVIRONMENT... this is the \$64000 question and one that is still being defined...

→ Some of the recent conversations have identified the following distinctions

- Industrial environment typically means that the public is excluded (or restricted) – often a workplace which could be a “factory” or warehouse with low to high energy transfer capabilities.
- Service environment typically means that the public can be exposed and interact with the public (all ages, sizes, and health status).
- Overlaps between industrial and service are within the power & force limited “manipulator” standards area...

POSE... *Long used, but only defined (for WG3) in TR 11065.*

→ Combination of position and orientation of a part of a robot (e.g. its mechanical interface) or of a workpiece in a coordinate system.

ADOPTED FROM OTHER STANDARDS, CONSENSUS AMONG GROUP MEMBERS, SOMETHING ELSE?

- Robot was defined in RIA's R15.06, which started in 1982.
 - Based on Consensus during the standardization process.
 - Morphed into Industrial Robot due to the new (at the time) needs of service robot standardization efforts.
- **Automated robot** is redundant term. Robots are automated.
- **Tele-operated robots** is simply a form of control. Stating tele-operated robot is a term that is not needed. We do not state "pendant controlled" or other. With WG3, the requirements for automatic operation, how to program are stated but how it is done is not specified unless it is restricted because of risk assessment.
- **Environment** is still up in the air as to a good definition for standardization... *safety requirements differ depending on environment*
- **Pose** is WELL-UNDERSTOOD in industry, such that there is little demand for a definition. If needed, it can be readily found using the ISO Online Browsing Database (<https://www.iso.org/obp/ui#search>).

ISO – WHAT IS THIS?

- The International Organization for Standardization is an international standard-setting body composed of representatives from various national standards organizations.
- Founded 1947, the ISO promotes worldwide standards, headquartered in Switzerland, including 164 countries.
- Standards are written for a particular audience and purpose.
 - Safety standards are directed towards manufacturers and integrators (if part of the sector) – never the end-user!
 - Language is in the terms of the user of the standard – often simple terminology
 - Performance standards are directed towards testing or a particular, narrow scope for manufacturers and integrators, usually with technically precise terminology

QUESTIONS?