

Collaborative robots in industry - summary of the web discussion

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This is a short summary of the web discussion Held at the 26th May 2015

What is the legal status of robots: machines or partly completed machines? Can suppliers claim to sell “safe robots”?

- Robots can be placed on the market as (integrated) machines or as partly completed machines
- ISO 10218 distinguishes between robots (i.e. partly completed machines, subject to a declaration of incorporation) and integrated *robot systems* (i.e. complete in the sense of Directive 2006/42/EC and that can be CE marked)
- Robots are sold as “safe robots” to end users. Problem: lack of information, misuse/misunderstanding of the declaration of integration (e.g. SME do not know the difference between the declaration of conformity and the declaration of integration). There are few integrators on the EU market capable of CE marking robot systems.
- To solve this problem, Denmark started an information campaign to inform both users and suppliers
- A robot (system) is a machine if its industrial application is defined in such a way that a complete risk assessment can be carried out before CE marking
- The Guide on the application of Directive 2006/42/EC seems not yet to reflect sufficiently the particular aspects of robots (e.g. how must the terms “normal use” and “misuse” be understood in the case of robots that are programmed?)

Which are the specific aspects of risk assessment for collaborative robots? How can the risk assessment take into account the psychosocial aspects of using collaborative robots in industry?

- The Machinery directive requires that psychosocial aspects be considered in the risk assessment for collaborative robots (see 1.1.6 in Annex I)
- The feedback from German users is that work with collaborative robots installed in accordance with BG recommendations is felt as helpful and positive
- However, the issue of ergonomics cannot be limited to physical aspects; users could feel psychological stress because they are not completely sure what the robot will do next
- The Machinery directive requires that machinery is designed so as to avoid risks in case of an error by the operator; this requires careful attention with robots

- Is there a higher level of psychological stress when working with a robot than when working with other machines?
- The possibility to stop the machine (emergency stop and normal stop) is always needed, e.g. to take a break
- If the pain onset is used as criterion for robot design it needs to be considered that different levels of algesia exist

Can the concept “power and force limiting” defined in ISO TS 15066 be applied to ensure health and safety at work?

- Which biomechanical thresholds should be used? Shall the system integrator apply a worst case scenario to account e.g. for the various parts of the body potentially offended, the variability between operators and for the same operator throughout a work shift? Or is there – in line with the risk assessment which needs to be carried out anyway – a possibility to consider certain scenarios as so improbable that they may be ignored?
- In the ISO WG there is still a discussion as to whether the force limits should, e.g. for the situations of foreseeable misuse, be based on “harmless” impacts (which are not considered injuries) or always on the *pain onset* which corresponds to a lower force level
- From a legal point of view, the concept “injury” (leading to a declaration of occupational accident) varies from one European country to the other; how can this be combined with the concept “harmless contact”?
- Can the concept “power and force limiting” only be used for dealing with residual risks, or can it – under certain circumstances – be used as the main risk reduction measure?
- In any case, the hierarchy of the Machinery Directive has to be applied: the manufacturer has to ensure as far as possible by technical means that a contact between the worker and the robot is avoided

If wished by the participants or necessary owing to new developments in standardisation another web discussion can be organised by EUROSHNET.