

THERMAL SPRAY APPROACH IN TERMS OF STANDARDIZATION

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Abstract Thermal spraying (TS) is considered along with welding, a "special process". Standardization in the field requires a coherent set of data and is an indispensable tool of any organization that uses TS and implementing a quality management system. The old Technical Committee CT 155 Coating by thermal spraying was included in CT 39 Welding and allied processes, having the European correspondent CEN/TC 121 and CEN/TC 240, respectively at international level ISO/TC 44 and ISO/TC 107/WG 1. Involvement Romanian Welding Society (ASR) has resulted in the content of Technical Patrimony Committee ASR/CT 39 ASR/CT 39 "Welding and allied processes-Coatings by thermal spraying. This also contains the 75% of SR EN's, about 15% SR EN ISO.

Using the standards leads to improved efficiency, as is required in applications, both those which are working in design, operation, and those who provides consulting and audit activities, involved in a company that applies TS[1-6].

1. GENERAL ISSUES OF STANDARDIZATION

Standardization requires a coherent set of data and it is an economic and commercial instrument, indispensable to any organization which implements a quality management system. Using standards leads to improved efficiency, being obligatory in applications, both those which are working in design, operation, and those who provide consulting or audit activities involved in an enterprise [4]. Standardization is an activity which establishes real or potential problems, provisions for a common and repeated use, aiming to obtain an optimum order degree in a given context. This activity consists in particular in the development, dissemination and implementation of the standards. The standard represents the technique rule incontestable, recognized and consecrated in Romanian technique and legal spectrum. Always, standards must be planned with appropriate essential requirements relevant technical regulations, adopted when there is sufficient consensus to support implementation [1]. Standardization effort is focused on increasing transparency and community of the standards used to increase interoperability, maintaining the compatibility, interchangeability or concepts community, procedures, equipment, design and thus to reduce the acquisition cost. Standardization can have qualitative and quantitative advantages, to all who are prepared to take initiative and utilize to achieve their goals. Standardization takes into account market demand, the degree of development and human and financial resources. Note that the specific purpose of standardization is to ensure the ability to use a product, process or service [1,2,5,6].

Quality, with direct impact on socio-economic development of any state, requires a standardization activity, correlated with the research which must be focused on strategic areas of high technology which promote technologies of greater interest.

Standards represents the document established by consensus and approved by a recognized body that provides for common uses and repeated rules, guidelines or characteristics for activities or their results, in order to achieve an optimum degree of order in a given context (ISO/IEC Guide). The standards should be based on combined results of science, technology, experience and lessons learned and to have the aim the promoting of the benefits of community. The entire work is determined by mandatory rules, in certain cases and other voluntary commitments. They are included in laws, regulations or

administrative: international standards, regional, national codes of practice, guides well-known organizations or bodies in certain areas, professional and corporate standards[2].

2. THERMAL SPRAYING – PROCESS WITH CONTINUE APPLICABILITY

Thermal spraying (TS) is considered, along welding, as a "special process". TS, related to welding process known as high applicability because present numerous advantages. Currently, there are industries where thermal coating technologies is essential. There are two major research and innovation in terms of thermal coatings: obtaining new materials with increased characteristics performance and using of sophisticated technologies to improve the characteristics of the deposited layers. Parallel efforts are made to increase productivity, lower costs and obtain more robust technologies and greening the process. Thermal spray coating technologies of composite layers, cermet, ceramic or metal-ceramic, biocompatible are unclear areas subjects research, this primarily due to incompatibility between the layers and the base material.

TS is characterized by a strong interdisciplinary, reflected by the involvement of many sciences and disciplines (engineering and technology, surface coatings), metallurgy (including powder metallurgy), chemistry, corrosion behavior, tribocorrosion involving mechanical and chemical interactions but also electrochemical between surfaces, characterized by synergy, health (including occupational), robotics and automation which must ensure quality and quantity deposits with constant thickness, environmental protection imposed by environmental management etc.), and the constant concern of many international bodies (ISO/EN, OSHA, IIS/IIW, EWF).

Examples of layers obtained by deposition TSP are zinc coatings including corrosion protection to metal bridges, Fe-Ni-B-Si with a great strength and minimal porosity, Fe-Cr13 economic deposit with high resistance used more especially in repair, NiCrAlY for high resistance to corrosion at high temperature turbines, Ni-25C deposits abrasion resistant for active components of the compressor, component oxides Al_2O_3 for high strength textile industry, resistant to oxidation, WC-Co12 for deposits of high-strength, high component required functional layers of borides deposited on Cu-Ni-Al substrates, for rehabilitation of marine propellers supposed to wear, cavitation and corrosion, hydroxyapatite deposited on medical implants, WC-Co-Cr for a better wear behaviour, at deposited layers on the interior surfaces with good rezistance, tested in severe conditions [3].

3 IMPLICATION OF THE STANDARDIZATION APPROACH THERMAL SPRAYING

Thermal spraying (TS) is a traditional industry standard at international and regional organizations (International Institute of Welding IIS/IIW), International Organization for Standardization (ISO) International Electrotechnical Commission (IEC), European Committee for Standardization (CEN), European Committee for Electrotechnical Standardization (CENELEC). The old Technical Committee CT 155 Thermal spraying was included in the CT 39 Welding and allied processes, having the European correspondent with CEN/TC 121 and CEN/TC 240, respectively at international level ISO/TC 44 and ISO/TC 107/WG 1. Involvement of Romanian Welding Society (ASR) has resulted in content of Technical Committee Patrimony ASR/CT 39 "Welding and allied processes-thermal spray coatings. It contains 75% of SR EN's[3,4].

Concerns are turning to composition and technical supply of powders EN 1274:2005, surface pretreatment of metal parts and components for TS-SR EN 13507:2010, parts treated with TS-Technical delivery conditions EN 15311:2007, Terminology–classification

EN 657:2005, symbolic representation on drawings of coatings by TS SR EN 14665:2005. Acceptance inspection of equipment by TS is largely standardized, as follows: Part 1 General requirements SR EN 1395-1:2007, Part 2 Flame spraying including HVOF SR EN 1395-2:2007, Part 3 Electric arc spraying SR EN 1395-3: 2007, Part 4 Plasma spraying SR EN 1395-4:2007, Part 5 Plasma spraying in chambers SR EN 1395-5:2007, Part 6 Handling systems SR EN 1395-6:2007, Part 7 Powder supply systems SR EN 1395-7:2007.

Security requirements relative to TS equipment, powder control units are regulated in SR EN 15339-2:2007, the qualification procedure in SR EN 15648:2009, TS coordination how it is applied with tasks and responsibilities is given in SR EN 13214:2004. Constructive recommendations on the design of the covered components by TS are given in SR EN 15520:2008, determination of the adhesion strength by tensile loading is regulated in SR EN 582:1995, and shear resistance of coatings obtained by TS is regulated in SR EN 15340:2007. About 15% of the standards in this domain are ISO's. Testing of coatings obtained by thermal SR EN ISO 14923:2004, treatment and final processing SR EN ISO 14924:2006 coatings against corrosion and oxidation at high temperatures, SR EN ISO 17834:2006, determination of the deposition efficiency SR EN ISO 17836:2005, other zinc coatings, aluminum and other inorganic coatings, SR EN ISO 2063:2005[3,4].

Operators qualification for TS is regulated by SR EN ISO 14918:2002, wires and rods for TS with flame and electric arc, classification and technical conditions of delivery are given in SR EN ISO 14919:2002. TS and fusion coating with autofondant alloys is given in SR EN ISO 14921:2004 and the procedure for applying coatings for mechanical components in SR EN ISO 14921:2002.

A constant concern is to ensure quality conditions for structures obtained by TS, as follows: Part 1 Guidelines for selection and use SR EN ISO 14922-1:2004, Part 2 Quality complete requirements SR EN ISO 14922 -2:2004, Part 3 standard quality requirements SR EN ISO 14922-3:2004 and Part 4 Elementary quality requirements SR EN ISO 14922-4:2004. 10% of the standards are STAS's which have not yet entered in the harmonizing process (for example STAS 11684/5-84), STAS 11684/6-85 - Execution prescriptions for coating by TS by melting of the deposited metal with metallic powders, STAS 12390/2-89 refers to at ceramic powders, types and quality technical conditions, respectively STAS 12390-85 - types and quality technical conditions for metallic powders by TS.

4 CONCLUSIONS

1. Standardization activity is particularly concerned about ensuring the scientific, technical and economic standards provided by national, European and international who is valued by making quality products according to customer requirements. The main benefits of standardization are mentioned: increasing the quality of all products, improving the adequacy of their processes and services with international goals such as removing barriers to trade and facilitate technological cooperation. Standardization plays a precursor of the modernization of industry and should be considered when industry must cope with various national and international challenges.

2. The emergence of global markets has made the standards to be absolutely essential for the survival and prosperity of multinational organizations, because their products and services must be accepted and work in environments, different cultures and different value systems [1-6].

3. Thermal spraying, treated as a "special process" along with welding processes, by the high interdisciplinarity and increased applicability is the focus of standardization [1,2].

4. The old Technical Committee TC 155 Thermal spraying was included in the TC 39 Welding and allied processes, correspondent with the European CEN/TC 121 and CEN/TC 240, respectively at international level ISO/TC 44 and ISO/TC 107/WG 1.
5. Involvement of Romanian Welding Society ASR has resulted in content of Heritage Technical Committee ASR/CT 39 ASR/CT 39 "Welding and allied processes-thermal spray coatings. ASR contains 75% EN's and about 15% ISO's (testing of thermal spray coatings, treatment and final processing of coatings, coatings against corrosion and oxidation at high temperatures to determine the deposition efficiency, other zinc coatings, aluminum and other inorganic coatings) and 10% STAS's, which have not yet entered in the harmonization process (execution prescriptions, types and quality conditions) [3,4].

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