SANT'AMBROGIO
Servizi Industriali Srl – Milano

WEBINAR ON PRESSURE VESSEL AND HEAT EXCHANGER DESIGN

April 6th - 15th 2021

The content of this webinar has already been presented many times in Italy in numerous conferences organized in various cities, at least twice a year, starting from 2005. The health situation due to Covid19 has however forced us to transform these conferences into webinars: in 2020 we therefore organized, on the same topic, two webinars in the months of October and November, for which we registered a much larger participation than in the previous conferences, thanks also to the lower rates that the absence of a logistic organization allows us to to practise; after all, the costs are much lower even for the participants, who are able to attend the lessons without leaving their office. We therefore thought, as had been requested by many, to organize a webinar also in English, aimed at the designers of pressure vessels and heat exchangers who reside anywhere in the world. Obviously, the difference in the time zone of the participants can be an obstacle: with the time chosen for this first international webinar, European engineers and those residing in countries with a late timetable compared to CET are obviously favored; based on requests, we will try to organize a subsequent webinar at a time that also favors those who have an early schedule.

PROGRAM

The webinar offers a first introductory day on the general rules of mechanical design and other moments of in-depth study of the most critical aspects of the design of individual equipment, comparing the application of calculation codes with particular reference to **ASME Section VIII division 1 and 2**, the German code **AD 2000** and the **European harmonized standard EN 13445**.

April 6th 2021 - Lesson 1A: GENERAL NOTIONS OF PRESSURE VESSEL DESIGN - 1st part

April 7th 2021 - Lesson 1B: GENERAL NOTIONS OF PRESSURE VESSEL DESIGN - 2nd part

April 8th 2021 - Lesson 2: MECHANICAL DESIGN FOR INTERNAL AND EXTERNAL PRESSURE

April 9th 2021 - Lesson 3: MECHANICAL DESIGN OF BOLTED FLANGE CONNECTIONS

April 12th 2021 - Lesson 4: THERMAL DESIGN OF SHELL & TUBE HEAT EXCHANGERS

April 13th 2021 - Lesson 5: MECHANICAL DESIGN OF SHELL & TUBE HEAT EXCHANGERS

April 14th 2021 - Lesson 6: PRESSURE VESSEL DESIGN FOR LOADS OTHER THAN PRESSURE

April 15th 2021 - Lesson 7: DESIGN FOR CYCLIC LOADS

Who should attend the webinar? The webinar is of particular interest for engineers working for pressure vessel manufacturers, users, engineering companies and inspection bodies. It is aimed not only to designers, but also to people who deal with certification, quality and preparation of offers.

What is the purpose of the webinar? The main purpose of the webinar is to make participants understand the most correct design procedures by using the formulas contained in the main international standards, underlining the differences between them and showing, also by means of practical examples, how it is possible to reduce equipment weights and costs while maintaining compliance with the reference standards.

Participation fees - Price for each lesson (1A+1B is one lesson)

- Sant'Ambrogio licensees and **EPERC** members — 150 Euro + VAT(*)
- Other participants — 200 Euro + VAT(*)

(*) VAT is applicable only to Italian companies or individuals

Special conditions are provided for in the case of participation in all modules by the same person or by several people from the same company on the same module.

For information: Sant'Ambrogio Servizi Industriali S.r.l. Dr. Andrea Bordoni
Tel. +39 02 70603113 | santambrogio@sant-ambrogio.it | bordoni@sant-ambrogio.it

SANT'AMBROGIO
Servizi Industriali Srl - Milano

DETAILED PROGRAM

Note: CET=Central European Time

Lesson 1 - GENERAL NOTIONS OF PRESSURE VESSEL DESIGN

April 6th 2021 [9.30 - 12.30 CET] and April 7th 2021 [9.30 - 12.30 CET]

- General principles: design according to ASME and design according to PED
- Material selection
- Risk analysis: pressure, temperature, risk of overheating, risk connected to quick opening closures
- Design procedures: design by formulae (DBF), design by analysis (DBA) and design by experiment (DBE)
- Loads and stresses: hints of stress analisys, stress categorization
- Loading conditions
- Failure modes
- Stresses and strains
- DBF: cross comparison of different design standards
- DBA: general description of the different methods
- Practical examples

Lesson 2 - MECHANICAL DESIGN FOR INTERNAL AND EXTERNAL PRESSURE

April 8th 2021 [9.30 - 12.30 CET]

- Calculation for internal and external pressure of cylindrical shells, spherical ends, domed ends, conical shells.
- Reinforcement openings
- Flat ends
- Practical examples of Pressure Vessel design using the software

Lesson 3 - MECHANICAL DESIGN OF BOLTED FLANGE CONNECTIONS

April 9th 2021 [9.30 - 12.30 CET]

- General principles for the design of a gasketed joint: bolt tightening, gasket seating, residual gasket compression needed to assure leak tightness
- Criteria for gasket selection - hints on self energizing gaskets
- Different flange types: welding neck, slip on, loose, reverse, with full face gasket
- Main methods for flange calculation: Taylor-Forge, DIN, Annex G of EN 13445.3, EN 1591.1
- Cross comparison of the different methods
- Practical examples of flange design using the software

Lesson 4 - THERMAL DESIGN OF SHELL & TUBE HEAT EXCHANGERS

April 12th 2021 [9.30 - 12.30 CET]

- Basic principles of thermal design
- Different types of shell&tube heat exchangers
- Thermal exchange in single phase flow: heat transfer coefficients and pressure drops
- Single phase flow in a tube
- Single phase flow across a tube bundle: different types of baffles
- Fouling factors
- Two phase flow: condensers and reboilers
- Thermosiphon reboilers
- Vibrations
- Practical examples of thermal calculations using HTRI® software

Lesson 5 - MECHANICAL DESIGN OF SHELL & TUBE HEAT EXCHANGERS

April 13th 2021 [9.30 - 12.30 CET]

- Different heat exchanger types: floating head, U-tube, fixed tubesheet
- Design of tubesheets
- Fixed tubesheet exchangers: Annex J of EN 13445-3
- Design of expansion bellows
- Design of pass partitions
- Practical examples of mechanical design using the software

Lesson 6 - PRESSURE VESSEL DESIGN FOR LOADS OTHER THAN PRESSURE

April 14th 2021 [9.30 - 12.30 CET]

- Calculation of tall vertical vessels for wind and seismic loads
- Horizontal vessels on saddle supports
- Nozzle loads
- Pressure vessel supports
- Practical examples using the software

Lesson 7 - DESIGN FOR CYCLIC LOADS

April 15th 2021 [9.30 - 12.30 CET]

- General principles of fatigue design
- Simplified fatigue assessment according to AD S1 and to Clause 17 of EN 13445.3
- Detailed fatigue assessment according to AD S2, to Clause 18 of EN 13445.3 and ASME Section VIII division 2
- Practical example of a complete fatigue calculation using the simplified method of Clause 17 EN 13445.3

Teacher of the webinar: Dr. Fernando Lidonnici

Dr. Lidonnici boasts fifty years of experience in the thermal and mechanical design of pressure vessels and shell and tube heat exchangers. Since 1990 he has been **coordinator of WG53/CEN TC54**, which manages **part 3 (Design and Calculation) of the European standard EN 13445** (Unfired Pressure Vessels). He actively participated in the drafting of the Italian legislation in the sector and in the subsequent development of the same after the entry into force of the Pressure Equipment Directive. He has been an **ASME member** since 1986. From 1994 to 1998 he was a **consultant to the European Commission for the preparation of the PED**. Within the **CTI (Comitato Termotecnico Italiano)** he manages the **Italian "Mirror Group"** which discusses and comments on the draft projects normally developed by TC54. He is the **Italian delegate to the "Pressure Equipment Advisory Nucleus"**, the CEN working group that coordinates the European standards relating to all products covered by the PED. In December 2018 he received the **Donald Julius Groen Prize** from **IMechE**, the British association of mechanical engineers, for his activity in the field of European standardization. In June 2020 he was appointed **president of EPERC, the European Pressure Equipment Research Council.**

SANT'AMBROGIO
Servizi Industriali Srl - Milano

REGISTRATION FORM - WEBINAR ON PRESSURE VESSEL DESIGN

Company / Association _____

Sant'Ambrogio licensee / EPERC member yes ☐ no ☐

Codice fiscale (*) _____

VAT code (**) _____

Address _____

City _____ Postcode _____ Country _____

Business sector _____

Phone _____ Fax _____

E-mail _____ Web site _____

Participant: First name _____ Surname _____

Role in the company _____

E-mail participant _____

(*) for Italian participants only (**) for European participants only

Sant'Ambrogio Servizi Industriali Srl, as data controller, informs you that, pursuant to art. 13 D. lgs. 196/2003 and EU Regulation no. 679/2016, your data will be processed according to the information that can be consulted on the page *https://www.sant-ambrogio.it/en/privacy/* of our web site. The manifestation of your consent is essential for the provision of the requested service.

Finally, Sant'Ambrogio reminds you that you may at any time modify or suspend the provision of the service, as well as exercise all the rights referred to in Article 7 of Legislative Decree 196/2003, by sending an e-mail to the address *santambrogio@sant-ambrogio.it*

☐ I agree ☐ I do not agree

The amount of the transfer must correspond to what is indicated on the registration form, including VAT (if applicable). The fees include: teaching material, certificate of participation.

Date _____ Signature _____

Total amount paid _____

For lesson(s) ☐ 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 ☐ 6 ☐ 7

Terms of payment

Please send the registration form and a copy of the payment by March 26th 2021. For organizational reasons, please respect the payment deadlines.
Phone +39 02 70603113 | Fax +39 02 2663546 *santambrogio@sant-ambrogio.it*
The payment of the registration fee must be made exclusively by bank transfer in favor of:
Sant'Ambrogio Servizi Industriali srl - Bank account n° 742 - UBI BANCA - Via Fabio Filzi 23 - Milano

IBAN: IT86Q0311101606000000010742 BIC: BLOPIT22
Reason for Payment: Webinar April 2021 - "First name and Surname participant, lesson(s) "

Cancellation policy

We require full payment at least 7 days prior to the course date. Cancellations received up to 7 business days prior to class will not be charged the training fee. Registrant substitutions may be made at any time. In the event of a course requiring rescheduling due to instructor illness or unavailability, the cost of the course will be refunded in full, or alternatively rescheduled at a later date. Should you not be able to attend the rescheduled course, a full refund will be provided.

How to participate

The lessons will take place on Microsoft's TEAMS®. All participants will receive by email the invitation to join the course, together with the instructions and the relevant slides.