SANT'AMBROGIO Newsletter – November 2009

SANT'AMBROGIO Servizi Industriali srl
piazza C. Donegani 8 - 20133 Milano (Italy)
tel. +39.02.70603113 fax +39.02.2663546
e-mail: *santambrogio@sant-ambrogio.it*
web site: *http://www.sant-ambrogio.it*

The importance of European standardisation for the Industry of all the world.

All manufacturing activities concerning Pressure Vessels are slowly moving from Western Europe to Eastern Europe and the Emerging Countries (mainly **China** and **India**). This tendency is particularly relevant in France and Germany, where well known manufacturers (particularly of Steam Generators) have closed their home manufacturing facilities and bought manufacturing shops in countries with lower price of manhours, leaving at home only their Engineering and Commercial departments. Also Italy has been affected by this tendency, although several qualified Italian manufacturers are still on the market, particularly manufacturers of vessels made of special materials, or more generally of products where the cost of manhour has a lower importance in the definition of the final cost.

The world economic crisis, mainly due to financial reasons and not to real problems of the industry, **is now at its end**, and **the market outlooks for Pressure Vessels (in Europe and outside Europe) are certainly positive**. This is particularly true in the field of Pressure Vessels for chemical, petrochemical and energy plants, because the start of the economic recovery will certainly lead to an increase on the demand of oil products, bio fuels, alternative energy sources (mainly of nuclear energy): in all these activities Pressure Vessels play a key role. An industrial world where 1,600,000,000 Chinese and 1,200,000,000 Indians are now entering not only as workers, but also as consumers, will of course require food and bicycles, but also the demand of cars, planes, electric appliances and many other products will necessarily increase. And this is the best guarantee for the survival and further development of the Mechanical (and Pressure Vessel) Industry also in Europe and in U.S.A.

However we should expect that **the qualification of the new competitors coming from the East into the Pressure Vessel market will be progressively growing**, so that in a few years they will also be capable to supply pressure vessels made of special materials with the same quality level of the Western manufacturers. **What kind of standardisation is the best one in order to help this process for the mutual advantage of all the involved countries**?

The standardisation system which is now almost universally used in all the emerging countries is the **American system**, made of **ASME codes and standard**s for Vessels, Boilers and Piping, **TEMA standards** for Shell & Tube Heat Exchangers, **AWS standards** for Welding, **ASNT standards** for NDT Testing, **SA/ASTM Standards** for materials. The main advantage of this system is that it covers all the components of any pressure assembly, whatever is the kind of industry (chemical, energy, food, refrigeration, etc.) for which it has to be designed. **All these standards are coherent within themselves**, that is they have been prepared considering all the requirements of the other American standards concerning the same piece of equipment. Moreover, **their use is very simple**: you need only to read very carefully the customer's specifications and to apply in detail all the prescriptions of the applicable standards, and then you will be able to build a product which is properly designed, fabricated and inspected. Just to make an example, many pressure components (nozzle flanges, valves, etc.) are simply designed on the basis of a rating table, which gives you the allowable pressure on the basis of the temperature and of the material type. Of course the pressure is not the only existing load, although it is generally the one which is determinant for the design; but allowances have been made in the standard in order to guarantee that the component is able to withstand also the other logically existing loads: this is the reason why, in the case of standard nozzle flanges, bolting areas are much larger than the bolting areas required by pressure. In this way no calculation is needed, neither for the pressure nor for the local loads (except, of course, for the most pedantic customers). **It is clear that a system like this is the best one for new manufacturers that have no previous experience**: you have just to follow the rules, then your product is accepted

because strict compliance with the rules is considered to be the best guarantee of safety.

But what are the disadvantages of this system? Well, **in all the American standards there is a general tendency to cut the design costs by increasing the weights**: very **low allowable stresses** (in ASME Section VIII division 1 – Unfired Pressure Vessels - and in Section I – Power Boilers - the allowable stress on Carbon and Low Alloy steel is limited by a safety factor of 3,5 on the tensile strength), high **minimum thicknesses** (ASME Valves, TEMA heat exchangers), formulae and rules relatively simple and conservative. **In all the European standards the tendency is exactly opposite**: to **refine as much as possible the calculations**, starting from a **specific risk analysis** which takes into account the particular features of each pressure component (by the way, this is basis of all the European technical directives) and increasing as much as possible the allowable design stresses; **to increase the amount of NDT** on the final product **and the amount of testing on the materials** used for fabrication (the Pressure Equipment Directive requires the guarantee of the material manufacturer on the hot tensile and creep properties, and a greater amount of testing for low temperature service). **The use of a system like this is of course more difficult**, and it requires more qualified personnel, particularly at the design stage. But **at the end the final cost of the product will be lower**.

However the creation **of the European system has still to be finalised**: in the context of the PED we have made very good and advanced standards (like **EN 13445, the Unfired Pressure Vessel standard**) made by CEN TC54. However **the criteria used for this standard do not always match with the criteria followed by the other CEN TCs** dealing with Pressure products (Boilers, Piping, Flanges etc.). These criteria are sometimes determined by the nationality of the experts which gave the greater contribution for the preparation of each specific standard in each specific TC. That is the reason why the European standardisation system, although more modern than the American system, is still behind from the point of view of the mutual harmonisation of the standards within themselves: and unfortunately the **terrific bureaucracy existing in CEN** (due also to the very heavy procedures provided in order to get the approval of so many different countries with different technical backgrounds) doesn't help very much to solve the problem.

Unfortunately also the **European Commission is not helping very much**: and not only because **the financial support to standardisation in the field of pressure systems has been completely withdrawn**. There are other problems, that I have mentioned many times on our newsletters: for example the **survival in France, Germany and UK of the old national Pressure Vessel standards** (CODAP, AD and PD 5500). These standards are still accurately maintained by the experts of the relevant national committees, with the financial support of the local industry. Is it really possible that some people in France, Germany and UK are really convinced that the interest of their countries relies on the survival of the old national Pressure Vessel standards? The reality is that **this situation is only subtracting resources to the European standardisation system**, thus delaying its finalisation, that can only be made when the EN standards will be generally used by all the European industry. **A problem like this can only be solved at the Commission's level**; provided somebody is really willing to take care of it.

The creation of a **European standardisation system** is also important for another reason: for the **positive influence that it could have on the modernisation of the American system**. Many American experts share the opinion that new less conservative standards are necessary. A very good example of a standard like this is the **2007 edition of ASME Section VIII division 2**. The **influence of EN 13445** on that (completely new) code is evident for everybody: **same safety factors** for Carbon and Low alloy steels, **same values for the hydrostatic test pressure**, **similar criteria for fatigue** in welded and unwelded components, **new Design by Analysis methods explicitly based on limit analysis** used as an alternative to the traditional methods based on elastic analysis. However **the contacts among the experts from both sides of the Atlantic Ocean are very few**: it seems that some important reason exists why the American experts are not allowed to take part as observers in the CEN TC or WG meetings, while the same thing happens for the European experts in the PVRC meetings: just to make an example, a lot of research work has been made on both sides on specific subjects (like leak tightness of gaskets),

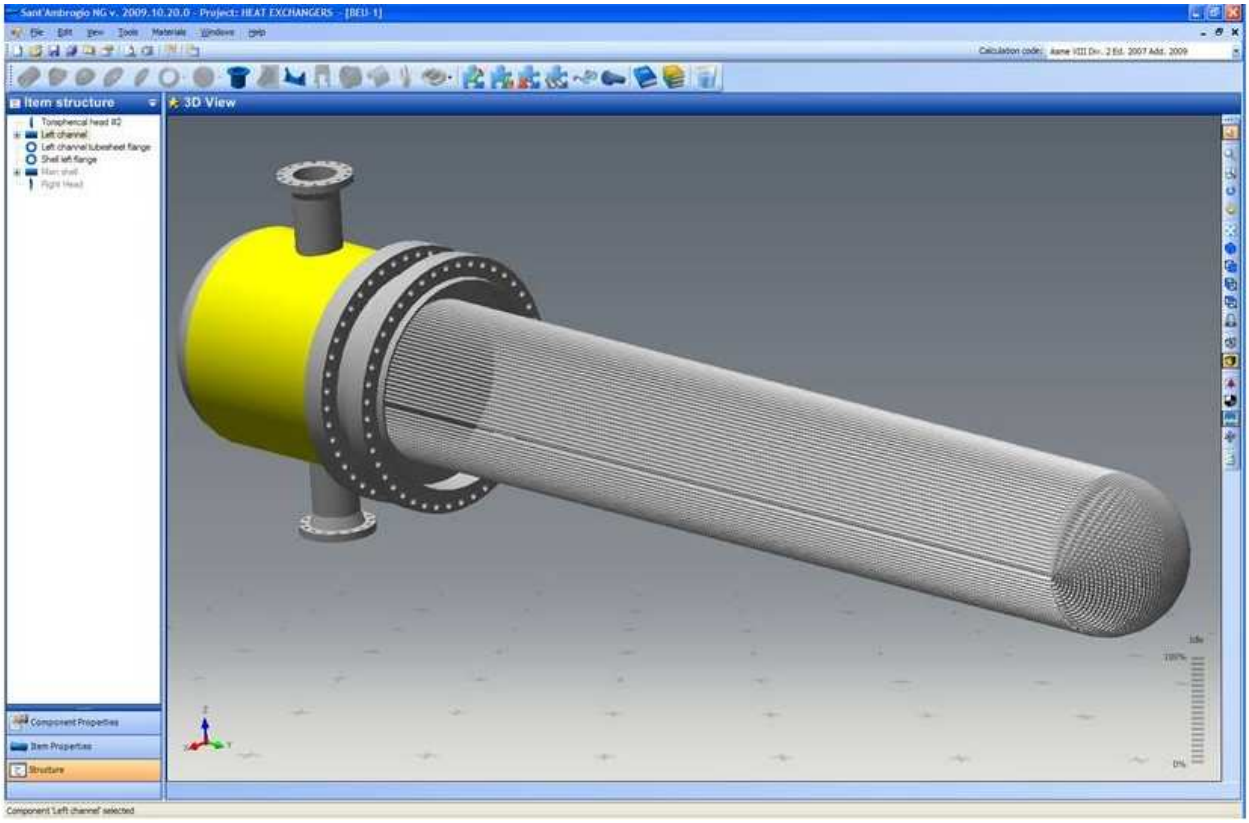
but up to now a common discussion of the results in view of the possible creation of a more modern flange design method has not been started.

Of course **discussions and exchange of experiences are not easy, considering the difference in technical philosophies**: the American philosophy based on the complete acceptance of all the details of a specific code or standard in order to assure safety, the European philosophy based on the need of performing an accurate risk analysis for each specific case, because the particular standard used (even a harmonised EN standard) is not sufficient by itself to assure the same. Nevertheless, after 19 years of work in the European standardisation, I have seen that **when engineers of different countries, schools and opinions meet around the same table they may have very hard discussions at the beginning, but at the end they will find a solution** (unfortunately this is probably true for engineers only, certainly not for politicians).

Many years of work are probably needed before the European system made of harmonised CEN standards and of compulsory technical directives will have the same degree of coherence and completeness of the American system. But **if the Europeans are all willing to build and to use a system like this**, if they are willing to **share their experiences also with experts outside Europe**, this will be probably **positive for the industry of the whole world**. Of course, in order to do so, they should start to feel themselves Europeans: will ever this be possible?

Fernando Lidonnici

What's being cooked up?



Our new software (**"Next Generation"**) according to the **2007 Edition of ASME Section VIII division 2,** is now being completed with the heat exchanger components (tubesheets, floating heads, etc.). The first "**beta versions**" have already been distributed to a selected number of licensees in order to get their comments. These beta versions are **already in compliance with the 2009 addenda**. We are also developing a new feature of the software: the **possibility of performing calculations not only with the last edition, but also with the preceding ones** (which sometimes is required for projects with long term deliveries).

We have also updated our **ASME VIII division 1 software with the calculation of the MDMT (minimum Design Metal Temperature) and with the checking for testing conditions.** A **direct link** has been provided with the **CARVES** software (Calculation of the stresses due to local loads on nozzles according to **WRC 107/297**) for the users that have also a licence of this program, in order to check a nozzle for pressure and for local loads without the need to repeat the input data.

Since most of the design methods in the two divisions of the ASME code are substantially equal (Flanges, Heat Exchanger Tubesheets, etc.), **the next development of the ASME VIII division 1 software will be to be brought in line with the "Next Gen" approach used for ASME VIII division 2**. We wish to remind the advantages of this new approach:

- **Graphical 3D construction** of each item
- **Material data base** containing **all the ASME materials** allowed by the Code
- Every time **a new component** is added to the model, **all the other components are checked again** for compliance with the new input (this is useful, for example, in the **calculation of the hydraulic test pressure**)
- Possibility to **set a liquid level** in order to **calculate automatically all the hydrostatic heads**
- **New output** with **figures**, **formulae with mathematical presentation,** calculation of the **weights** and possibility to issue a **printout also in case of components having insufficient thicknesses** (of course with **comments in red**)

We will not forget the other software packages, according to **EN 13445.3** (the **2009 edition** of this standard is expected for December), **VSR**, **VSG** and **AD 2000.** Also these packages will be brought in line with the Next Gen style, but unfortunately the preparation of the material data base will take a lot of time, even if we will limit ourselves to a selected number of materials, including, of course, **all the harmonised material standards of the PED**: in fact in the case of the European standards the **variety of materials is much greater than with the ASME code** (all materials are allowed, provided a Particular **Material Appraisal** is carried out in the cases where the material specification doesn't provide the hot tensile characteristics or the impact tests at low temperature).

We welcome our new licensees:

A & G Srl – Martina Franca (Taranto) - **ITALY**
CKD Chlazeni – Chocen – **CZECH REPUBLIC**
CMS Srl – Paderno Dugnano (Milano) - **ITALY**
ENDRESS+HAUSER Sicestherm Srl – Pessano con Bornago (Milano) - **ITALY**
GAMM Impianti – Varedo (Milano) - **ITALY**
ISAB Srl – Priolo Gargallo (Siracusa) - **ITALY**
ITALMATIC Presse Stampi Srl – Carraia – Capannori (Lucca) - **ITALY**
KLIMA Sarl - Marcq en Baroeul - **FRANCE**
KLIMA Warmtetechniek - Hamont-Achel - **BELGIUM**
KNM Process Systems – Seri Kembangan - Selangor – **MALAYSIA**
MATEC snc – Fenegrò (Como) - **ITALY**
PRINCO Srl – Parre (Bergamo) - **ITALY**
TATRAVAGONKA a.s. – Poprad – **SLOVAK REPUBLIC**
THERMOENGINEERING Srl – Milano - **ITALY**
TÜV SÜD Industrie Service GmbH – Mannheim – **GERMANY**
VDL Klima - Eindhoven - **The NETHERLANDS**
VDL Klima - Zaventem - **BELGIUM**
VDL K.T.I. – Mol - **BELGIUM**
VESANI Engineering – Tygerdal – Western Cape – **SOUTH AFRICA**
ZAMIL STEEL – Dammam – **SAUDI ARABIA**