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1 Hardware

All the operations involved in the design process are performed by the use of workstations which shares data and printers/plotter through a LAN from the servers. All data and drawings are made available via WiFi to all the manufacturing areas by the use of Terminal Services (e-Workshop).

- + Server:_____HP ProLiant ML-370; HP ProLiant ML-150/Web
- + LAN:_____HP ProCurve Switch
- + WiFi:_____ZyXEL ZyAIR G-3000H; 3Com Building-to-Building Bridge
- + Workstations:_____HP XW 4300; HP Vectra ML-420; HP Vectra VLi6; HP Compaq DC-7100; HP Ascentia P
- + e-Workshop:_____no. 07 HP Thin Client T5530 (manufacturing dept.)
- + Printers:_____Plotter HP DesignJet 120; HP LaserJet 2100; HP OfficeJet D series; HP OfficeJet 9100
- + Backup:_____IOMEGA - NAS 150D SERIES - 1.0 TB (4X250GB)

All the system is well kept up to date by a "three years maintenance contract" stipulated with Hewlett-Packard in order to assure the complete efficiency with assistance "on site" within 24 hours and, at the end of the contract, the replacement with new devices.

2 Operating Systems

Engineering dedicated software is installed on all computers which runs completely compatible operating systems so as to assure the data access from any branch, any time:

- + Servers:_____Microsoft Windows 2003 Server
- + Workstations:_____Microsoft Windows XP
- + e-Workshop:_____HP ThinConnect - Stateless / Windows CE



3 Software

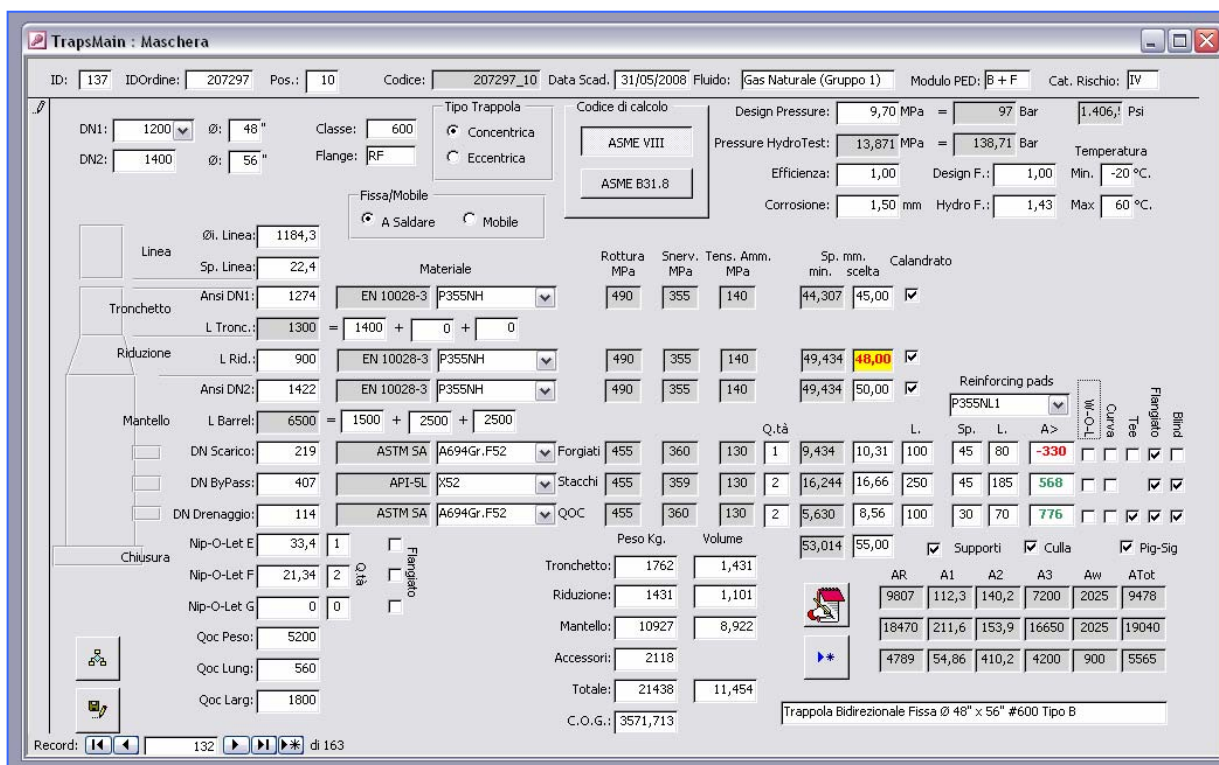
The software chosen to produce the best results in our engineering applications is the outcome of many years of experience in the field, where we found that the reliability is a key point only if the upgrade operations are at the same level in order to keep full compatibility with older versions and other applications. The operating areas supported are the following:

- + Calculations: _____ MS Office 2003 Excel; Access
- + 2D Drawings: _____ AutoCad LT 2005
- + 3D Design: _____ SolidWorks® Design 3D
- + Design Validation: _____ CosmosWorks® – FEM (Finite Elements Module)
- + Imaging: _____ Acrobat Distiller; TIFF creator

The safety of all our applications and their relevant data is assured with a Back-Up system governed by a procedure included in our quality system.

3.1 Calculations

The first stage of the design activities is actuated by the dimensions definition which are developed with a software based on both **Microsoft Excel & Access 2003®**. The key operations have been automated by our engineers and cross-checked by a Third Party Inspection Agency in order to get the European Pressure Equipment Directive conformity.



The screenshot displays the 'TrapsMain : Maschera' software interface. It features a top navigation bar with fields for ID, IDOrdine, Pos., Codice, Data Scad., Fluido, Modulo PED, and Cat. Rischio. Below this, there are sections for defining trap parameters (DN1, DN2, Ø, Classe, Flange, Tipo Trappola) and material specifications (Materiale, Rottura, Snerv., Tens. Amm., Sp. mm. min., scelta, Calandrato). A central table lists various components like 'Linea', 'Tronchetto', 'Riduzione', 'Mantello', 'DN Scarico', 'DN ByPass', 'DN Drenaggio', 'Chiusura', 'Nip-O-Let E', 'Nip-O-Let F', 'Nip-O-Let G', 'Qoc Peso', 'Qoc Lung.', and 'Qoc Larg.' with their respective dimensions and material codes. To the right, there are sections for 'Reinforcing pads' and a table for 'Supporti' (AR, A1, A2, A3, Aw, ATot). The bottom of the interface shows a 'Record' section with navigation buttons and a total weight calculation.

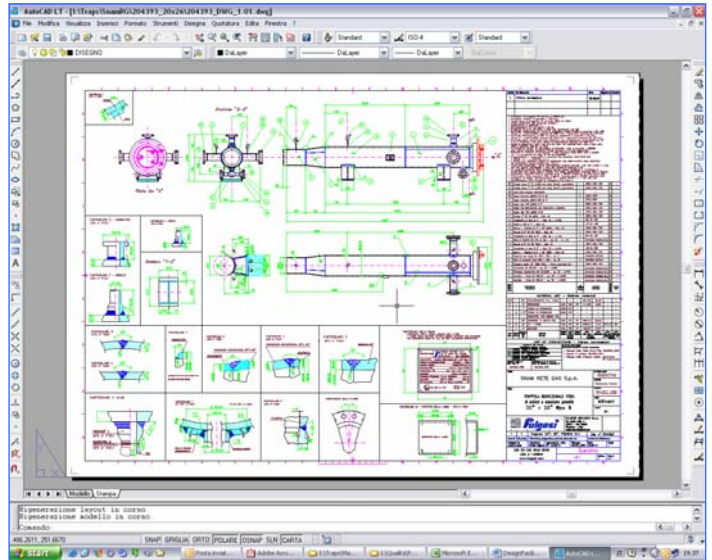
Compliance with the Customer's Purchase Order is also assured by a link which get the design data from the same database source as the commercial dept., this allow also the "real time" effect on both departments in

case of modifications or additional requirements on the job-order. As shown in the screenshot above, the aim of this instrument is to minimize the possible errors caused by the manipulation of huge data to be processed in very complex formulas. In fact, with this software, the operator can get the results in terms of Wall Thickness, Weigh, Volume, Centre

Of Gravity and so on, by just inserting few data (Diameters, Length, Design/Operating conditions) and choosing the relevant required governing code.

3.2 Drawings (2D)

When required the 2D drawings are currently made by the use of **Autodesk AutoCad LT 2005®**. The hard copies are printed with the HP DesignJet Plotter for production purposes and, when necessary, converted in an image or document format such as *.tiff or *.pdf for quick e-mail share and information/approval for Customer and Suppliers. The picture shows a screenshot of a 20" Bidirectional Pig Trap issued for Customer's approval, the drawing contains all information relevant to the project as well as the testing and painting characteristics required. Of course as explained in the next section the opportunities offered by the new tools available in the 3D design software makes 2D design completely outdated therefore is kept alive just for backward compatibility purposes.



3.3 Design (3D)

The 3D drawings are no longer produced with AutoCad because of the limited use for production's purposes, in fact, the 3D technology is now used for both research and production with a new and much more flexible system which include all the functionalities: **SolidWorks® Design 3D**. As shown in the following pictures, this is the best solution to

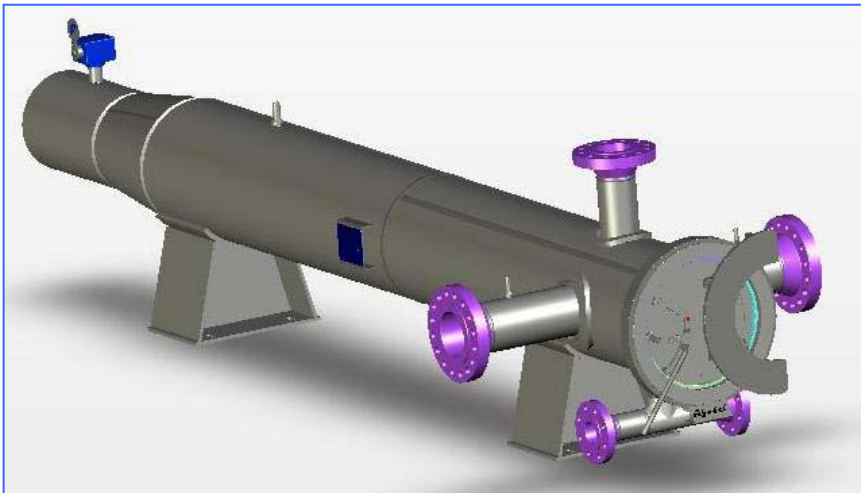
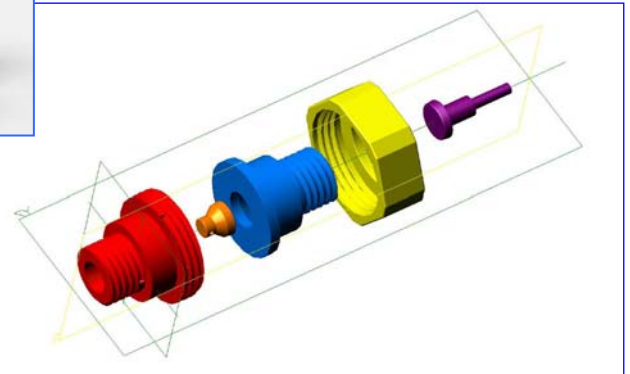


figure out the simulation of new ideas/products prior the manufacturing. SolidWorks® Design is a 3D parametric solid modelling application which provides 3D mechanical design, real-time collaboration and data sharing and management. Each drawing produced as both single part or assembly, can be configured so as to generate a single *.exe file that can be e-



mailed to any recipient offering full functionality in terms of views and printing characteristics without the need of any dedicated software: eDrawings™ software, the first email-enabled communication tool that dramatically eases sharing of product design information. Fast, reliable, and convenient,

eDrawings files supply accurate representations of 3D models and 2D drawings created with the most widely used CAD systems on the market. eDrawings offers unique capabilities like point-and-click animations that make it easy for anyone

with a PC to interpret and understand 2D and 3D design data. The online, CAD-neutral environment enables engineers to securely share precise design data, reducing costs, shortening manufacturing cycles, improving productivity and driving quality. After choosing a candidate build, engineers then fill in more details until they can create a set of drawings for the parts that need to be fabricated. SolidWorks® Design then generates all of the drawings needed semi-automatically. So, beginning from the smallest detail, we can get the overview of the most complex mechanical object. The more than realistic result is a perfect condition to determine the more suitable manufacturing cycles as well as components positions. The exact physical layout of the components has a dramatic impact on quality of the final product. Mechanical, Electrical, as well as any packaging or other constraints must be considered for each component in the design. SolidWorks® Design allows the engineers to visualize the exact physical topology of a new product. This lets us examine many potential layouts to select the one to build. Of course all products generated are ready to be analyzed with the Finite Element Modules by the use of a fully integrated software as shown in the following section.



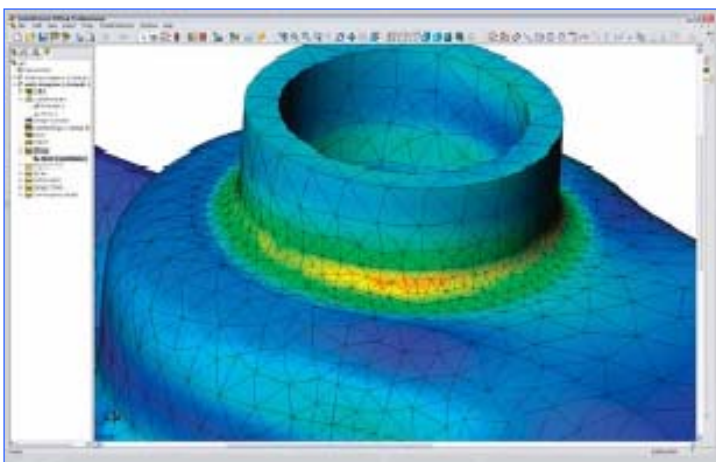
3.4 Finite Elements Module analysis (FEM)

COSMOSWorks is a powerful, easy-to-use design validation and optimization software fully embedded within SolidWorks® software. It offers a wide spectrum of powerful tools to help engineers who are familiar with design validation concepts to perform virtual testing and analysis of parts and assemblies. The use of COSMOSWorks is perfect

to predict the physical behavior of practically any part or assembly under any loading condition.

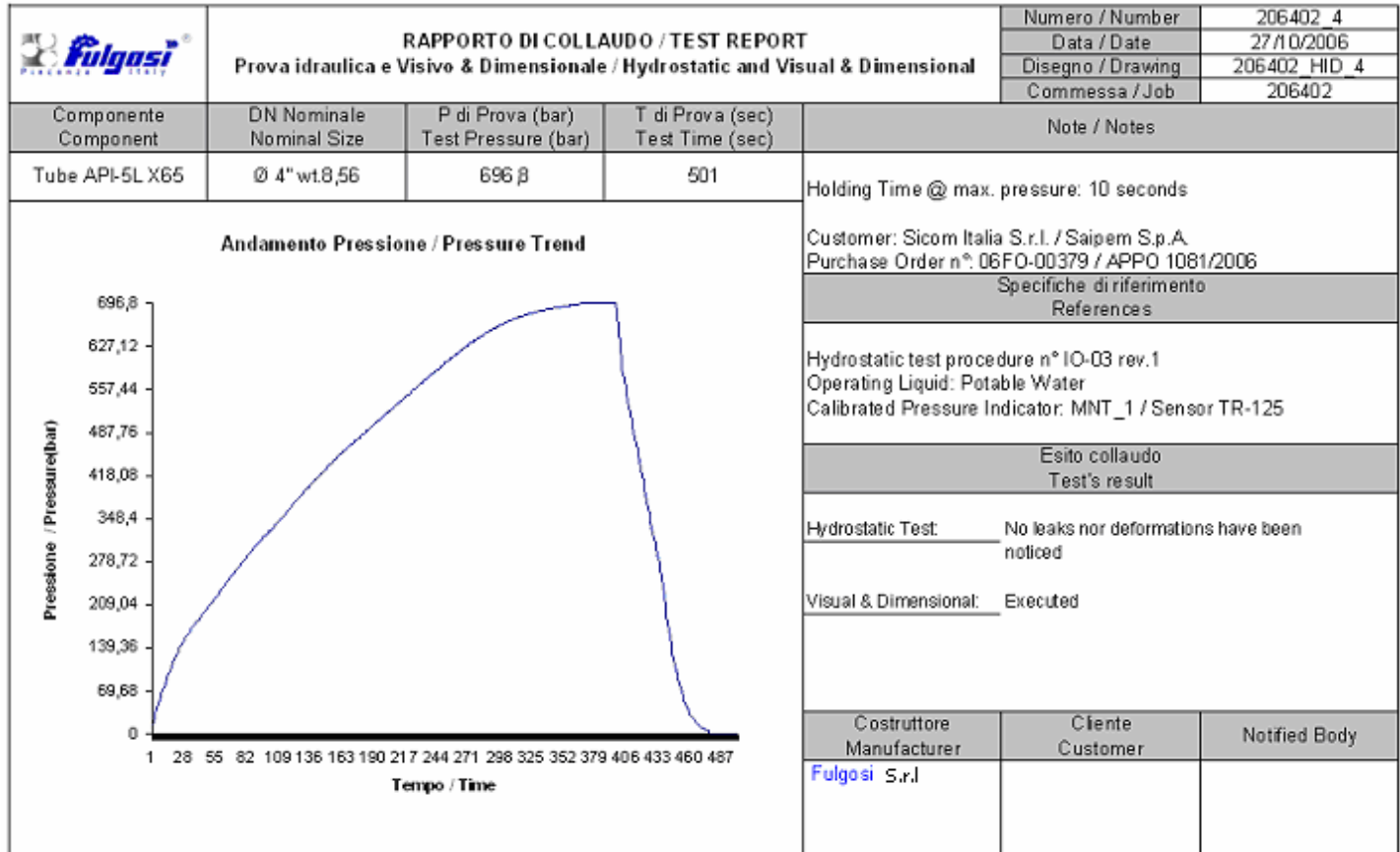
In addition to the design validation capabilities included COSMOSWorks offers drop test, design optimization, thermal heat transfer, thermal stress, vibration, buckling, and fatigue analysis providing significant product quality benefits; enabling engineers to detect design problems in less time than a prototype could be built. This practice enables faster, less costly, and more optimized product development, as well as

more in-depth examination of product performance than would ever be possible using even the most detailed prototypes, so we found it as the perfect tool to improve design quality, avoid field failures, reduce material costs and shorten time-to-market.



3.5 Testing

The "real" product's validation is made by a final pressure test. It can be both a prototype *Burst test* or a simple *Hydrostatic test*, the results are recorded in a diagram **Microsoft Excel 2003®**. The following screenshot show the output of the Hydro-Testing Bench.



4 Disclaimer

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AutoCad™ is a trade mark property of Autodesk Inc. ®, all rights reserved.

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