

## INOSSIDABILE

Edited and published by Centro Inox



## Summary

For more detailed information please contact directly the names indicated at the end of each notification

## COVER/PAGES 3/4

THE OTHER SIDE OF AN ADMINISTRATION  
(L'altra faccia di un'amministrazione)

The premises of the technical and administration offices of the Municipality of Casalpusterlengo have been lately submitted to an enlargement. The south-west front and a part of the north-west front of the building have been completely re-designed and re-planned with totally new standards in comparison with those of the existing structure. For the north-west front an isostatic curtain wall has been built, consisting of 10 + 10 mm stratified float glass panels horizontally fastened to the floors by means of couplers formed by stainless steel brackets, and in the middle of the intermediate floor, to the vertical pillars placed outside the façade, through a system of stainless steel cables and struts welded to the vertical columns, which provide an elastic support to the glass sheets. The whole glass structure recalls in this way the principles of sailing. Stainless steel - especially grade EN 1.4301 (AISI 304) - has also been extensively used for all the structural elements of the new entry of the building: brackets, glass-fasteners, tie-rods, and pillars. The south-west façade is instead characterized by a stainless steel grate structure with square holes, which houses and surrounds the safety fire escape.

**Customer:** Comune di Casalpusterlengo (Milano) / **Main contractor:** Spinelli Costruzioni e Architetture Srl - Alcamo TP - Dalmine BG / **Layout and project:** Studio Architetti Associati Mario Antonio Arnaboldi & Partners - Via Perrone di San Martino 14 - I-20125 Milano, phone +39 02 69016390, fax +39 02 6880733, studio@arnaboldiepartners.it, www.arnaboldiepartners.it / **Associated architects:** Mario Antonio Arnaboldi, Laura Francesca Immaturò / **Structures:** Mario Antonio Arnaboldi / **Structural coordinator:** Claudio Chesi / **Structural analysis:** Paolo Rugarli / **Assistant architects:** Davide Benini, Piercarlo Bonori, Francesca Malaguzzi, Alessandro Rollino

## PAGE 5

FERRITIC AND AUSTENITIC STAINLESS STEELS COMBINED IN A GATE: AN INTERTWINING OF TECHNOLOGY AND INNOVATION  
(Inox ferritico e austenitico uniti in una cancellata: un intreccio di tecnica e innovazione)

In Italy, and in general in Europe, ferritic stainless steels have still to overcome the scepticism of a tradition based on the more widely used Cr-Ni stainless steels (EN 1.4301, 1.4307, 1.4401, 1.4404 / AISI 304, 304L, 316, 316L grades) in building and architectural applications. For the gate and the fencing of its premises, a service centre for stainless steel has chosen a new and unprecedented solution, that is to say a combination of EN 1.4301 (AISI 304) austenitic stainless steel, in the form of welded square-section tubes, and of EN 1.4509 (also known as 441) ferritic stainless steel in the form of welded round-section tubes and strips (for covering the small entry gate). The polished surface finishing of the 1.4509 ferritic stainless steel round elements creates a particularly attractive aesthetic effect, which contrasts with the satin-finished grade 1.4301 austenitic stainless steel square-section tubes used for the fencing and proves to be an optimal solution face to the environmental corrosion-proof characteristics of the material. The gate is in fact located in an area close to a street rich in potentially corrosive elements, which in any case can hardly stick to a polished surface that can be easily washed out by rainfalls. The coupling of different types of stainless steel should not arouse any concern about a possible onset of galvanic corrosion phenomena. In general, stainless steels with different structures (austenitic, ferritic, martensitic steels, etc.) are reciprocally compatible, in the sense that they do not produce the electrochemical conditions that give rise to this phenomenon. In the building and architectural industry, and particularly in street furniture, the fact of relying on more economically competitive materials might open again the routes, already followed in the past years, to applications in which other materials have traditionally succeeded in imposing themselves.

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## PAGES 6-7

FROM OUR MEMBERS  
A.D. TUBI INOSSIDABILI

Established in 1997, in little more than ten years of activity, AD Tubi Inossidabili SpA is present on the market as one of the most outstanding suppliers of welded tubes for special applications, such as thermal exchange, power plants including nuclear power, condensers, desalinators, etc. As from autumn 2008, in the new premises of Casnate con Bernate, the company confirms its commitment to the development of high quality products through the installation of new production lines, which are the result of a research on heat treatments. The corporate philosophy has always been characterized by a continuous study for the development of high-range products in the position to guarantee maximum compliance with the production standards in force, and to meet customers' special requirements. The corporate quality system makes use of a totally equipped laboratory, which can internally perform any destructive and non-destructive control test and includes also an electronic scanning microscope (SEM). AD Tubi Inossidabili SpA has been regularly certified by TÜV in compliance with ISO 9001:2000 standards. Furthermore, the company has also gained further product certifications: AD 2000 Merkblatt W0 (ADW2) certified suppliers' certification with TÜV Nord, European Directive 97/23/EC (PED), Lloyd's approval and INSPECTA approval for nuclear applications. A continuous attention paid to high quality has allowed AD Tubi Inossidabili SpA growing and developing exponentially in the space of few years, and gaining a high reputation worldwide. An evidence of the company's quality standards is provided by the high share of exported products in European and non-European countries, supported by the presence of a sales office based in North America.

**A.D. Tubi Inossidabili SpA** - Via Adige 2 - I-22070 Casnate con Bernate CO, phone +39 031 630672, fax +39 031 4036983, info@adtubi.com, www.adtubi.com

## PAGES 8-9

## MAIN CORROSION PHENOMENA ON STAINLESS STEELS

## (Principali fenomeni corrosivi negli acciai inossidabili)

There are many factors that can give rise to a corrosion phenomenon. Among them: the nature of an aggressive agent (type, concentration, pH); the temperature of an aggressive agent; the surface finishing or coating of the metal; the fluid speed on the material walls. The most common forms of "wet" corrosion to be detected on stainless steels are:

**Pitting corrosion,** a corrosive phenomenon caused when some areas of the passive film break down in consequence of the action of strongly activating elements, such as, for instance, chloride (Cl<sup>-</sup>) or fluoride (F<sup>-</sup>) ions. Pits grow on the surface and are characterized by a crater (anode area) surrounded by a halo (cathode area). These pits can be whether of a penetrating or of a cavernous nature. It is advisable to avoid environments containing high amounts of chlorine and in general halide ions, and choose instead alloys with high chrome and molybdenum content, which are characterized by a more resistant passive layer.

**Interstitial or crevice-corrosion,** when the passive film breaks down in presence of a corrosive substance, and corrosion spreads due to the scarce oxygenation that occurs in a crevice, or in any case in areas in which a corrodent can easily stagnate. It is therefore advisable to eliminate any crevice, gap or stagnation area, and to use instead stainless steels with more resistant passive layers (i.e. with high chrome, molybdenum and nickel contents).

**Intergranular corrosion.** When the chromium content drops below the minimum percentage (about 10.5%) that is able to ensure "stainlessness", and in presence of an aggressive agent, corrosion attack takes place. To avoid this phenomenon it is necessary, in the case of austenitic stainless steels, to use L-type stainless steels with low carbon content, or steels stabilized with appropriate quantities of titanium or niobium (for example, 316Ti or AISI 321 steels). Ferritic stainless steels, such as the ELI (Extra Low Interstitial) ones, are practically free of this kind of corrosion, as they have low carbon content and a concomitant presence of stabilizing agents.

**Stress-corrosion-cracking,** which is produced by the simultaneous combined action of a mechanical tensile stress and a chemical attack that may give rise to cracks, particularly on austenitic structures. To avoid this phenomenon, it is possible to use stainless steels with either a partial (austenitic-

ferritic or duplex steels) or a completely ferritic structure, or an austenitic one but with very high Ni content.

**Galvanic corrosion.** It is well known that when materials with different "nobleness" grades are put into contact with one another in presence of an electrolyte, this action is a premise for the onset of this kind of corrosion. Great care must therefore be taken that no couplings are made with less noble materials, which would give rise to anodic behaviours. To avoid this corrosion attack it is necessary to couple the stainless steel with another equally noble material, or stop the metal continuity between the two different materials by means of insulating elements.

**Hot oxidation.** This phenomenon, which involves the formation of dark oxides on the surface, depends on an excessive thermal alteration of the metal. To avoid this phenomenon it is necessary to use refractory stainless steels with high chromium content, whether belonging to the ferritic or to the austenitic family. Concerning instead heat treatments or welds, it is possible to use respectively controlled atmospheres or protection gases, which prevent the metal from coming directly into contact with the environment atmosphere.

## PAGE 10

## A SAFETY ISLAND AND FLOWER BOXES IN MILAN, CORSO ITALIA

## (Spartitraffico e fioriere a Milano, in Corso Italia)

A building, known as "La Nave" (The Ship) because of its typical cantilever body looking on to corso Italia shaped like a prow, has been recently renovated. Particular care has been placed in the decoration of the public walkway by means of street-furnishing elements made of EN 1.4301 (AISI 304) stainless steel, and of a crystal shelter in front of the main entry, which is also lined with stainless steel panels. Along the walkway, a "safety island" system has been planned, which besides forbidding unauthorized car parking, makes the right direction of the internal passageway immediately understandable. The lighting system is housed in the parapet carter, which is made of 2 mm thick satin-finished stainless steel sheets processed by a bending press, and in which openings have been made for placing the lamps close to the ground. The parapet has been made using about 1 m high angle-bent posts, housed in satin-finished 60 x 8 mm stainless steel plate bases. The upper banister handrail is made of a satin-finished stainless steel 42 mm tube fastened to the top of the posts and provided with plugs at the ends. Furthermore, horizontal solid tubes made of AISI 304 stainless steel have been fitted between the posts by means of eight loops. This solution ensures greater strength and stiffness to the whole structure.

**Customer:** Pirelli & C. Real Estate SGR - Fondo Cloe / **Project:** Studio Pensa & Drago Architetti Associati - Via T. Agudio 8 - I-20154 Milano, phone +39 02 3452573, fax +39 02 3452029, info@pensaedrago.it, www.pensaedrago.it / **Supervision of works and general coordination:** Dott. Arch. Lorenzo Drago / **Contractor:** Vetreria Busnelli Srl - Via Gandhi 3 - I-20035 Lissone MI, phone +39 039 2454474, fax +39 039 2145073, vetbusnelli@libero.it / **Photographs:** Enrico Magri

## CLEAN AND SHINING ARE THE NEW STAINLESS STEEL POSTS FOR TRAFFIC SIGNS

## (Puliti e lucenti i pali inox per la segnaletica verticale)

The Municipality of Gaggiano, a small town in the south-west outskirts of Milan, decided to use stainless steel posts for the new traffic signs of the town, and to transform them into real urban furniture complements placed next to the buildings and monuments of the historic town centre. These posts consist of hexagonal-section tubes internally assembled to flower boxes, and hold the traffic signs, which in turn consist of a stainless steel support to which the traffic sign is fitted. The stainless steel used for this purpose is EN 1.4301 (AISI 304). Furthermore, through a stainless steel arm with double articulation, each flower box is connected to an element, shaped like a "panettone" (the typical dome-shaped cake of Milan) to complete its function of traffic barrier, and is able to rotate up to 360°.

**Customer:** Comune di Gaggiano (Milano) / **Stainless steel tube supply:** Ilta Inox SpA - Strada Statale 45 bis, km 13 - I-26010 Robecco d'Oglio CR, phone +39 0372 9801, fax +39 0372 921538, sales@ilta.arvedi.it, www.arvedi.it/ilta / **Movable flower-box "Stop&Go":** Alfieri Raffaelli Eredi snc - Via Ponte Oglio, 9/11 - I-26032 Ostiano CR, phone +39 0372 840300, fax +39 0372 840283, info@stop-and-go.it, www.alfieriraffaelli.it / **Traffic signals by:** La Segnaletica Srl Orizzontale Verticale - Via Valleambrosia



40 - I-20090 Assago MI, phone-fax +39 02 57506964, laura@lasegnaletica.191.it

## PAGE 11

### STAINLESS STEEL STREET FURNITURE FOR THE HISTORIC TOWN CENTRE OF ALBENGA (Arredi inox per il centro storico di Albenga)

Albenga, a seaside resort of Liguria, in the province of Savona, boasts the most suggestive and best-preserved historic town centre of the Italian Western Riviera. Having to renew its street furniture, the Municipal Administration decided to choose stainless steel components.

**Pict. 1** - Bench model "Rifle inox" in EN 1.4301 (AISI 304) consisting of three laser cut 6 mm thick support shoulders connected to one another by a 60x2 mm diameter horizontal tubular bar. Seats and backs consist of 29 16x2 mm diameter tubular profiles closed at the ends by hemispheric plugs. The support standards are made of 48x2 mm curved tubes. All fasteners are made of stainless steel.

**Pict. 2** - Wastepaper basket "Martino inox", which includes an AISI 304, 1.5 mm thick elliptical container, provided with 8 mm square holes. The steel basket is tilting and fastened to zinc-plated and painted square tubular supports, and is pickled, passivated, and satin-finished.

**Pict. 3** - AISI 304 bicycle stand with a 40x2 mm diameter spiral tubular structure.

**Customer:** Comune di Albenga (Savona) / **Contractor:** Legnolandia Srl - Via Trieste Z.I. - I-33024 Forni di Sopra UD, phone +39 0433 88307, fax +39 0433 88551, info@legnolandia.com, www.legnolandia.com / **Stainless steel furniture manufacturer and supplier:** Codal Snc - Via del Lavoro 150, Z.I. - I-14100 Asti, phone +39 0141 477058, fax +39 0141 477091, codal@atlink.it, www.codal.it

### STAINLESS STEEL ENTERS THE MONZA CIRCUIT (L'acciaio inossidabile fa il suo ingresso nel tempio italiano della velocità)

The Monza circuit, in order to offer an even better reception to the guests of the F1 Grand Prix and of the other competitions, chose stainless steel: a stainless steel flooring has been installed in the Sassoli Group Hospitality Building. The use of stainless steel in the architecture and constructions gives the possibility to manufacture products featuring high quality, beauty and practicality. Stainless steel floorings are thought for a wide range of applications: private houses, offices, commercial areas, locations of public events, street furniture, etc. The tiles are made of stainless steel EN 1.4301 (AISI 304), size 600x600 mm. The wavy design of the surface with a 5 mm pitch, increases resistance and grip. Thanks to a special layer positioned under the stainless steel surface, the tiles prevent the transmission of knocks and vibrations to the floor. Easy-to-lay, they can be installed over existing floors.

**Wave Tangram floor producer:** Stainless Products - Viale delle Industrie 9 - I-20040 Cambiagio MI, phone +39 02 959499640, fax +39 02 959499641, products@stainless-products.it, www.wave-steels.it

## PAGE 12

### STAINLESS STEEL CABLE-HOLDING CHAINS FOR OIL DRILLING (Catene portacavi d'acciaio inox per la trivellazione petrolifera)

Stainless steel grade AISI 316L is used for the manufacture of huge drag chain systems for applications on offshore oil and gas platforms. A Monza-based Company participated in the «Statfjord Late Life» project by planning, engineering, manufacturing, testing and installing three systems, accounting for more than 36 tons of stainless steel.

The article focuses on the special characteristics of stainless steel drag chain systems, especially designed for successfully facing the many challenges of the offshore environment.

**Pict. 1** - 57 m-stroke North-South chain for the Statfjord B oil platform.

**Pict. 2** - 10.2 m-stroke East-West chain, with a special dragging and lifting structure for the Statfjord B oil platform.

**Pict. 3** - North-South chain for the Statfjord C oil platform installed with covers.

**Customer:** StatoilHydro, Stavanger, Norvegia / **Cable-holding chain production:** Brevetti Stendalto SpA - Viale G.B. Stucchi 66/8 - I-20052 Monza MI, phone +39 039 204901, fax +39 039 834250, info@brevettistendalto.it, www.brevettistendalto.it - **Special Projects Division:** Stefano Di Garbo, stefano.digarbo@brevettistendalto.it

## PAGE 13

### THE PERRERES TUNNEL IN VALTOURNENCHE REVIVES AGAIN (Rinascita la galleria Perrères in Valtournenche)

In October 2007, the 283 m-long Perrères tunnel of Valtournenche, Aosta Valley, has presented itself with a new and completely renovated look. The lighting lining of the gallery consists of flat 1.0 mm thick EN 1.4016 (AISI 430) stainless steel panels, pre-painted with a 20-25 micron double-layer RAL 9010 white paint with a polyester base, in order to make the passage from natural daylight to the artificial lighting of the tunnel less sudden and sharp. The Vernest® stainless steel lining is a guarantee of easy, simple and quick maintenance operations, which require no other special cleaning equipment but simple machines provided with rotating brushes.

The vertical perforated joint coverings have been especially shaped, and are complete with a double adhesive gasket and with 6.3 mm diameter self-tapping EN 1.4301 (AISI 304) stainless steel screws. The underlying supporting structure, which consists of omega-shaped profiles, is hot-rolled to conform to the tunnel radius and is completed with an anchorage system consisting of continuous thread M12 bars made of EN 1.4301 (AISI 304) stainless steel, while the double nut and the washers are made of EN 1.4301 (AISI 304) stainless steel. The insulation layer is formed by a semi-rigid mineral wool panel, with 50 mm thickness and 80 kg/m<sup>3</sup> density, reinforced with a double glass film.

**Stainless steel supplier:** ThyssenKrupp Acciai Speciali Terni SpA - Viale B. Brin 218 - I-05100 Terni, www.acciaitermi.it - **Marketing:** Dr. F. Ricci Feliziani, phone +39 0744 490275, fax +39 0744 490879, fabrizio.ricci-feliziani@thyssenkrupp.com / **Contractor:** S.P.A.I. Srl - Via M. Gatti 5 - I-25050 Timoline di Cortefranca BS, phone +39 030 9884295-6, fax +39 030 9884688, www.spaisrl.it

### THE QUALITATIVE IDENTIFICATION OF SOME ALLOY ELEMENTS - HOW CAN WE PROTECT OURSELVES FROM FRAUDS IN A SIMPLE, QUICK AND INEXPENSIVE WAY

(Novità nell'identificazione dei metalli - Come difendersi dalle frodi in maniera semplice, veloce e poco costosa)

**Manganese Reagent "Mn Chek"** (distinguishes AISI Series 200 from AISI Series 300): Highly reliable electro-chemical test kit for manganese. It makes use of a Mn reagent and of a 9 V battery. A pink halo immediately forms around the electrode if the material to test is AISI Series 200. The halo remains instead white in case of AISI Series 300.

**Passivity Test Kit "PTK"**: This test kit checks whether the surface is passive or not, and consequently capable to resist oxidation as requested by the specifications concerning stainless steel (AISI Series 300 and 400). The paper remains white if the surface is passive. A more or less intense pink colour indicates the more or less high passivity degree of the surface.

**Electro-chemical "DL12" Molybdenum Reagent:** A highly reliable electro-chemical molybdenum test kit for all alloys containing Mo, Hastelloy included, as well as for all kinds of stainless and special steels. It makes use of two solutions, and of a 9 V battery.

**"CELMO" Reagent Molybdenum:** If the metal contains molybdenum, the reagent becomes brown within 1-5 minutes. When there is no molybdenum, the colour of the reagent remains unchanged.

**Reagent production:** NDT Italiana Srl - Via del Lavoro 28 - I-20049 Concorezzo MI, phone +39 039 647590, fax +39 039 647799, info@ndt.it, www.ndt.it

## PAGE 14

### INOXWIND: THE VENTILATED RIDGE WITH THE STRENGTH OF STEEL

(Inoxwind: il colmo ventilato con la forza dell'acciaio)

To allow air circulation in the attic means to prevent the formation of humidity and mould. To allow the continuous flow of a current of air between the mantle and the single cover elements, it is necessary to place, along the ridge of the roof an element in the position to keep the bent tiles and the roofing tiles lifted. Inoxwind is a 2 m long ventilated ridge element consisting of a load-bearing profile made of 0.8 mm thick EN 1.4016 (AISI 430) ferritic stainless steel, capable to resist both mechanical stresses and corrosion. In the model for bent-tile ridges, the central bar is obtained from 156 mm long moulded bands, which are subsequently mechanically assembled. In the model for roofing tiles, the central bar is instead obtained from 150 mm long bands. These elements can be fastened to the roof through 1 mm thick and 15 mm long AISI 430 stainless steel brackets, and are supplied with EN 1.4301 (AISI 304) hooks, diameter 2.5 mm.

**Production:** Industrie Cotto Possagno SpA - Via Molinetto 80 - I-31054 Possagno TV, Divisione Tetti Ventilati, phone +39 0423 920701, fax +39 0423 920703, switchboard: phone +39 0423 9205, fax +39 0423 920910, ventilati@cottopossagno.com, www.cottopossagno.com

## PAGE 15

### STAINLESS STEEL SERIES 300: IS THERE ANOTHER ALTERNATIVE?

- A comparison among series 300, 400 and 200 stainless steels - (Inox serie 300: esiste un'alternativa? Inossidabili della serie 300, 400 e 200 a confronto)

Milan, November 5, 2008  
Via Massaua 6 - Conference Hall - Centro Servizi di Banca Popolare di Milano - 8.45-16.00 h

How many times have you lately heard about alternative stainless steels to traditional AISI 304 and 316 steels?

In several application fields, the rise in price, but above all, the extreme volatility of "traditional stainless steels" prices have produced in general a great deal of confusion in the processing companies, especially in the case of products in which raw material costs play an important role. Within this scenario different alternatives have emerged. Centro Inox, the Italian association for stainless steel development, wants to clearly express its opinion on this subject in order to support both manufacturers and market in making the wisest decisions depending on required applications. A set of corrosion tests aimed at providing an effective contribution in this area have been planned in partnership with RTM Breda and the Politecnico di Milano. The conference will be focused on these issues according to a

programme we are presenting here. The conference will be divided into two sessions: a technical-scientific session, in which the results will be discussed, and an application session, in which some processing companies belonging to different areas will present their experiences on the use of "new materials".

The official language of the meeting is Italian.

#### Programme:

Participants' registration  
Welcome address and opening of the meeting - (E. Amenduni - President of Centro Inox)

#### TECHNICAL-SCIENTIFIC SESSION

Introductory notes on corrosion, performed tests and results

**A general survey of the Italian market: the reasons for change** (P. Viganò - Centro Inox)

**Corrosion: General aspects** (P. Pedferri - Politecnico di Milano)

Coffee break

**Performed test programme: Corrosion tests, materials and purposes** (G. Stella, G. Rivolta - RTM Breda)

**Test results** (M. Boniardi, S. Cincera - Politecnico di Milano)

Debate

Buffet lunch

#### APPLICATION SESSION

From theory to practice: Users' experience

**Developments in regulations on food** (V. Boneschi - Centro Inox)

- Merloni TermoSanitari S.p.A. (A. Mancini) - Università Politecnica delle Marche (R. Fratesi)

- Vertical S.p.A. (A. Cogo - R. Fornasa)

- N&W Global Vending S.p.A. (T. Rota)

- Facilitas S.r.l. (A. Alboni)

- Elica S.p.A. (R. Del Basso)

Debate

Chairman of the debate: F. Capelli (Managing Director of Centro Inox)

**For additional information:** Centro Inox - Piazza Velasca 10 - I-20122 Milan, phone +39 02 86450559 / 69, fax +39 02 860986, eventi@centroinox.it, www.centroinox.it

### ADVANCED MODULAR COURSE "STAINLESS STEELS"

(Corso modulare avanzato: "Gli acciai inossidabili")

Milano, FAST Building, Piazzale R. Morandi 2

1<sup>st</sup> Module 11-12-18-19-25-26 February 2009

2<sup>nd</sup> Module 3-4-10-11-17-18 June 2009

Organized by AIM (Italian Metallurgy Association) in cooperation with Centro Inox

The 7<sup>th</sup> Edition will be held three years after the previous one.

Director and coordinator: Prof. Gabriele Di Caprio.

The official language is Italian.

For additional information, please contact:

**Organisers' secretariat**

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## PAGE 16

### SPECIAL STEEL FOR COOLERS - WINGTIP POD FOR THE EUROFIGHTER TYPHOON

(Acciai speciali nei Coolers - Wingtip pod, navicella di estremità alare, per Eurofighter Typhoon)

Modern military aircrafts are equipped with a number of electrically supplied devices, which require to be cooled. Stainless steel has been used in the coolers installed in the two wingtip pods of the military aircraft Eurofighter Typhoon, which are intended to cool down the black boxes housed in the pods. The choice of materials to be used fell on stainless steels grade EN 1.4301 (AISI 304) as regards tubes and tank, which are welded elements submitted to minor mechanical stresses, thereby privileging chemical and physical resistance properties.

For the structurally more important parts, a martensitic and precipitation-hardening kind of steel, UNS S13800, with extremely high mechanical properties was instead chosen. Moreover, for parts with a complex contour, which require a precision-fusion process, the choice fell on a kind of martensitic, precipitation-hardening steel, UNS S17400, EN 1.4542, particularly suitable to micro-fusion castings, with high mechanical properties and good resistance against corrosion.

**Planning, development, engineering and construction:** FIMAC SpA - Via Piemonte 19 - I-20030 Senago MI, phone +39 02 99010754, fax +39 02 99010759, fimac@fimac.aero, www.fimac-spa.it

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