

INOSSIDABILE

Edited and published by Centro Inox



Summary

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THE MOTORCYCLE SHOW SHINES WITH STAINLESS STEEL REFLECTIONS (Il Salone del Motociclo brilla di riflessi inox)

In the motorbike industry, stainless steel has been used for many years in the manufacture of exhaust pipes, but for the first time ever, at the EICMA 2006 (Motorcycle Show) in Milan, stainless steel stars also as a structural material.

The CRC, Cagiva Research Centre, in San Marino, in conjunction with Centro Inox, has in fact developed a new frame that goes by the name of AIF (Aluminum Inox Frame) made of AISI 304 (EN 1.4301) stainless steel and aluminium alloy, characterised by a patented system for the continuous adjustment of the motorbike set-up, in this case a supermotard, the STR 650 CRC.

It is fitted with a single-cylinder, 4-stroke, liquid-cooled engine and features an extremely innovative design, presented under the Husqvarna brand in a world preview at the EICMA 2006.

The stainless steel (in the form of seamless and welded tube, sheet and bars) captivated the attention of visitors to the motorcycle show not only for its mechanical characteristics but also for its aesthetic appeal (brushed finish).

The welds in the area of the steering sleeve are clear to see and the joint proves to be an aesthetic attraction, which would not be possible with traditional painted steels.

From a structural viewpoint, the road tests and other testing (such as the fatigue test) have confirmed the undoubted performance capacity of stainless steel.

For the supply of stainless steel products required to fit out the prototypes, we would like to thank: Marcegaglia div. Inox for the welded tubes, Mannesmann DMV Stainless Italia for the seamless tube, ThyssenKrupp Acciai Speciali Terni for the sheet steel and Acciaierie Valbruna for the bars.

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VENTILATED FACADES FOR THE NEW "LEONI CENTRE" IN MILAN

(Facciate ventilate per il nuovo "Centro Leoni" di Milano)

Construction of two new twin buildings, with ten floors above ground level, which make up the new "Leoni Centre" executive area has recently been completed in Milan. For the sophisticated architecture of the ventilated façades (Fig. 1), the designers decided on elegant slabs of "beola argentea" stone, for a total of 4,800 m², supported by stainless steel sections and bracketry.

Approximately 10 tons of EN 1.4401 (AISI 316) stainless steel were used, concealed from view from the outside. 20 types of bracket were used, several types of sections, both vertical and horizontal, as well as 3 types of wall screw anchors.

The stainless steel C-sections provide the desired shape for the ground floor pillars (Fig. 2) and create the pilasters for the first and second floors. It is on these pilasters that the brackets affixed to the lower and upper edges of the slabs of beola stone have been bolted (Fig. 3). The sections are anchored to the pillars by means of 4 stirrups (Fig. 4) and screw anchors, all made of EN 1.4401 (AISI 316) stainless steel.

In those places where the stainless steel brackets are secured directly onto the concrete, the slabs remain very close to the walls, whereas they are at some distance from them in those places where they are secured to the stainless steel vertical posts, thus achieving the forms conceived by the architect.

These ventilated façades make it possible to eliminate thermal bridges and the free circulation of air is guaranteed, thus ensuring the building provides high standards of hygrothermal comfort.

Client: Finzeta Siemens, Milano / **Designer:** Arch. Valentino Benati, Torino / **Works Management:** Maire Engineering, Torino / **Ventilated façades:** Ettore Bosio Srl Marmi Pietre Graniti - Via G.M. Bicetti De' Buttinoni 14 - I-20156 Milano, phone +39 02 33402958, fax +39 02 33402212, ettorebosio@iol.it, http://ettorebosioisrl.it / **Consultants:** Studio Ing. Fabio Piazza, Cantù CO

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FROM OUR MEMBERS THYSSENKRUPP ACCIAI SPECIALI TERNI GROUP - TUBIFICIO DI TERNI

Tubificio di Terni is a continuously growing company, which originally started off as an integration of Terni steel works and which has become the leader in the industry, especially for muffler tubes. It manufactures electro-welded stainless steel tubes for catalytic silencers and for decorative use. Constant, high quality standards are guaranteed thanks to the direct link with Thyssenkrupp Acciai Speciali Terni.

Products: the production lines weld steel from the austenitic and ferritic series, with a variety of thicknesses and diameters, offering a total of over 1,200 products, including also square and rectangular tubes, with brush, satin or glossy finish for every type of structural and ornamental application.

Production: The coils are marked with a code that accompanies the material along every subsequent processing stage, so as to guarantee the traceability of the material at any time. They are sheared into strips to obtain welded tubes, by means of moulding and welding (TIG, LASER and HF high frequency welding). After they have been welded, the tubes are brushed, marked, cut to the required length and finally packed. The high frequency welding is completed by blowing and then removing the shaving from the inside seam and smoothing the ends of the tubes.

Production lines: 1 slitter; 2 tubing lines with TIG welding process; 3 tubing lines with HF welding process; 2 tubing lines with LASER welding process; 3 rolling presses; 12 cutting machines (on TCT premises)

Quality process control: the quality controls are performed on the line. For structural tubes, these controls tend to guarantee the observance of the strictest tolerances in terms of dimensions, shape and surface appearance. For mufflers, in addition to the above-mentioned dimensional controls, additional checks on the quality of the welding are carried out: non destructive (Eddy Current) tests on 100% of products and destructive (flattening and expanding) on product samples.

Laboratory: The Tubificio di Terni has its own efficient laboratory, staffed by highly qualified experts and fitted with modern equipment to determine the mechanical and metallographic characteristics both of raw materials as well as of finished products.

ISO TS 16949 Certification ed. 2002 and ISO 9001 Certification ed. 2000.

Company details: 97% TKL-AST - 3% Nisshin Steel - 177 employees - Turnover: ~ 170 million € as at 30/09/2006 - Site area 40,000 m² - Floor area: 22,000 m² - Production capacity approx. 95,000 t/year

Registered office, offices and plant: Strada di Sabbione, 91/A - I-05100 Terni, phone +39 0744 808251, fax +39 0744 808266, info@tubificio.it

THYSSENKRUPP ACCIAI SPECIALI TERNI GROUP - SOCIETA' DELLE FUCINE

Società delle Fucine Srl, established in 1990, is now a wholly-owned subsidiary of Thyssenkrupp Acciai Speciali Terni and is ranked among the world leaders for the manufacture of large and medium forged parts.

As far back as 1884, the great iron and steel plant, Terni Co. was founded to meet the needs that had arisen because of the war. At the end of WWII, the iron and steel industry in Italy was reorganised and the plant specialised in the production and processing of high quality steels. Today, it covers a surface area of approximately 120,000 m² and is sized for the manufacture of large and medium forged parts made of carbon steel, medium-alloy steel and stainless steel.

Products: the forged parts are mainly intended for industries where maximum safety is required alongside service continuity. Società delle Fucine is equipped with cutting-edge plants for the production of steel, casting of ingots, forging, heat treatment, mechanical processing as well as destructive and non destructive testing.

Certifications: ASME approval (since 1975) of the Quality Management System and IGQ certification (Italian Quality Mark Association) as compliant with UNI EN ISO 9001:2000 (ISO 9001:2000) - Approval by Lloyd's Register

as manufacturer of forged parts made of carbon steel, carbon-manganese steel and austenitic stainless steel in compliance with the "Rules for the Manufacture, Testing and Certification of Materials" - Approval of products issued by TÜV Sud according to technical rules AD/2000 Merkblatt W2, W7, W10, W12 and W13 and associated Materials Specifications.

R&D: the ongoing research activities aim to perfect and rationalise the established technology, as well as to optimise the forging cycles and heat treatment or study the solidification of heavy ingots by means of mathematical models. When specific studies or enquiries are required, Società delle Fucine is efficiently supported by the Centro Sviluppo Materiali (CSM) both in Rome and in Terni operating premises.

Products - Electricity: low pressure, high pressure, low and medium pressure unitary rotors; shafts, compressor shafts and disks for combined rotors; rings for hydraulic turbines - Industrial, naval and aerospace sector: forging presses; shipbuilding; aerospace projects - Chemical, petrochemical and nuclear sector: shell courses, tube plates; pumps and valves; components for nuclear reactors; containers for the transportation of nuclear waste - Rolling cylinders: working cylinders for flat and shaped products and supporting cylinders - Steel for tools: blocks for moulding plastic, hot forming steel, chill casting, hot extrusion of light alloys and for auxiliary components.

Office and plant: Viale B. Brin, 218 - I-05100 Terni, phone +39 0744 44881, fax +39 0744 470912 / **Sales Direction:** V.le B. Brin, 218 - I-05100 Terni, phone +39 0744 488310, fax +39 0744 470913

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FERRITIC STAINLESS STEELS: WHY NOT! (Acciai inossidabili ferritici: perché no!)

In approximately 80% of applications where stainless steel has been used, the final choice of the type of alloy was restricted to austenitic types at Cr-Ni or at Cr-Ni-Mo, in particular, the widely known AISI 304 (EN 1.4301) and AISI 316 (EN 1.4401). The present conditions of the market have however forced the end user to look for stainless steels with similar performance levels but at cheaper prices. In particular, given the high impact of the cost of nickel and molybdenum on the end price of stainless steels, this search has turned to materials which contain smaller percentages of these elements or none at all.

Given the circumstances, it seemed appropriate to offer an overview of the ferritic stainless steels and to outline the possible uses in certain sectors as substitutes of the above-mentioned austenitic stainless steels.

Chemical composition (Table on page 8) - Ferritic stainless steels are characterised essentially by their chromium content, that ensures resistance to corrosion, whereas most of them lack any nickel content. Certain types contain stabilising elements such as titanium and niobium, so as to prevent any intergranular corrosion from taking place and making them less susceptible to the coarsening of the grain during welding and, at the same time, improving the cold forming qualities of the same (e.g. drawability). On the other hand, the presence of molybdenum increases resistance to corrosion. It is this very need to increase resistance to corrosion that has led to the devising over the years of so-called superferritic stainless steels, distinguished by increasingly high chromium and/or molybdenum contents, while at the same time keeping the value of interstitial elements such as carbon and nitrogen low, hence ELI, Extra Low Interstitials; the reduction in interstitial elements improves resistance to corrosion, especially intergranular, as well as weldability and workability so as to reduce the gap, as far as the latter is concerned, with traditional austenitic stainless steels. The chromium content is then pushed to levels in the range of 26% to ensure maximum resistance to heat oxidation and for the same reason silicon and aluminium can be added, as is the case of type EN 1.4762. This makes for the optimisation of characteristics such as resistance to corrosion, forming capacity and tenacity of the welded areas.

Physical and mechanical characteristics (Table on page 9) - Ferritic stainless steels are ferromagnetic, while austenitic stainless steels are paramagnetic. Heat conductivity is well above that of austenitic stainless steels, while the thermal

expansion coefficient is considerably less, with values closer to those of more common carbon steels. Ferritic stainless steels perform less well than austenitic stainless steels in terms of percentage elongation, despite maintaining considerable performance levels, especially in the stabilised versions. The yield point of ferritic stainless steels is generally slightly higher, whereas their tensile strength lets them down. As for austenitic structures, the only way to increase the mechanical characteristics is to resort to work hardening. It must be emphasised that, unlike the austenitic structure, the ferritic one is sensitive to the transition from strong to fragile, as the temperature gradually drops to values below ambient temperature.

Processing - When the welding parameters are varied appropriately and owing to the beneficial effects of stabilisation, even the welding of ferritic stainless steels is as easy as that of austenitic types. Resistance welding is well suited to this type of material in particular.

The cold deformability (drawing, pressure bending, etc.) is reduced compared to common austenitic structure steels (such as AISI 304 and 316) despite the addition of stabilising elements (Ti and Nb) contributing to the improvement of performance levels in this sense.

The behaviour during processing for chip removal is good, especially in the free-machining versions.

Resistance to corrosion: prospects for future applications - A value which makes it possible to summarise the performance levels of ferritic stainless steels compared to austenitic steels is the pitting resistance index, or PREN (Pitting Resistance Equivalent Number), calculated using the formulas indicated in the table on page 10.

It is just as important to remember that the ferritic structures are much more susceptible to a type of localised corrosion which is rather insidious, i.e. Stress Corrosion Cracking (SCC). It is quite clear that the 444 (1.4521) appears to be the same as the 316 in terms of corrosion resistance and therefore a valid cheaper alternative in a very extensive range of applications: roofing, drinking water tanks, exhaust flues, swimming pool components, street furniture in especially adverse situations, food industry components, etc..

It is a completely different story for the AISI 304. In fact, the AISI 434 (1.4113) or the 436 (1.4513) could offer comparable resistance to corrosion, but the presence of molybdenum cancels out any convenience in terms of economics. This is why it is necessary to make a more targeted selection of the end uses. To this end, the AISI 430, type 439 and type 441 appear to be valid candidates for applications such as: oven crockery, cutlery, interior furnishing components, panelling for lift doors, panelling for food industry machinery, components for street furniture in low pollution areas, drinks machine parts, coatings for interiors (walls, columns, etc.), hoods, hobs, refrigerators.

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THE NEW COUNTERS AT "FALCONE E BORSELLINO" AIRPORT IN PALERMO (I nuovi banchi dell'Aeroporto "Falcone e Borsellino" di Palermo)

The new waiting-list counters designed especially for Palermo Airport aim to mark the beginning of a new design, inspired by simplicity and clean-cut shapes, with a design approach aiming to reduce the distance between airport staff and passengers and to create a framework of excellent functionality and aesthetic appeal for the airport (clear and bright materials, warm colours and clean, direct graphic image). The block of waiting list counters is made up of 8 front line counters and 4 back office stations. The front of the counter is coated with a plate of ice-coloured glass and an EN 1.4301 (AISI 304) stainless steel plinth decorated with a linen cloth finish, Silver Ice® Clear anti-fingerprint lacquer coating; a small bag shelf is coated with the same steel fitted with Targetti "Minicove" festoon lamps at the bottom.

Client: Ges.Ap., Società di Gestione Aeroporto di Palermo SpA / **Designer:** CdP Design Srl, Roma - Architetti Umberto Berti e Paolo Monesi / **Realization:** Cutini Group Srl / **Anti-fingerprints Silver Ice® sheets supplied by:** Thyssenkrupp Acciai Speciali Terni SpA - Viale B.Brin 218 - I-05100 Terni - **Sales:** Ing. M. Moriconi, phone +39 335 7296256 marco.moriconi@thyssenkrupp.com - **Marketing:** Dr.ssa V. Fontana, phone +39 0744 490867, fax +39 0744 490879, valeria.fontana@thyssenkrupp.com, www.acciaitermi.it

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PRODUCTION OF NEUTRAL MICRO PELLETS FOR THE PHARMACEUTICAL INDUSTRY (Produzione di micropelletts neutri per l'industria farmaceutica)

The production of micro pellets (saccharose and wheat starch) is carried out according to GMP regulations and is used in the pharmaceutical industry for the production of special modified-release medication. Their processing requires bacterial count control and quality requirements which can only be guaranteed by means of physical separation, in vacuum, between the mechanical parts of the coating kettles (revolving cups for

product mixing) and the finished product collection outlet.

In a company from San Giuliano Milanese, which manufactures "sugar spheres", a purpose-provided department has been fitted out with 14 coating kettles inserted in stainless steel walls. The entire structure is made up of the following components, for which EN 1.4404 (AISI 316L) stainless steel was used:

- Tubular base frame • T and L section supporting structure, series PT5050T and PT5050L • Connecting crossbeams made of sections • 1.2 mm thick wall panels, with Scotch Brite finish, secured with stainless steel screws • Panel applied on the outlet
- Intake pipe manifold made of 114.3 mm diameter tube, complete with clamps • Push-button controls for the coating kettles built into the stainless steel structure. Two sealed stainless steel doors allow an easy access to the technical compartment.

Client: I.P.S., San Giuliano Milanese MI / **Stainless steel walls made by:** Senna Inox Srl - I-26813 Graffignana LO - Viale Marcora 15, Loc. Cesolone, phone +39 0371 209193, fax +39 0371 88466, lorenzo.riva@sennainox.it, www.sennainox.it / **Stainless profile sections:** Palladio Trading Srl - Via A. Boito 25/31 - I-31048 San Biagio di Callalta TV, phone +39 0422 7969, fax +39 0422 796969, info@palladiotradig.com, www.palladiotradig.com

A NEW WAY OF COLOURING AND PROTECTING STAINLESS STEEL

(Un nuovo modo per colorare e proteggere l'acciaio inox)

The "Gun Kote" protective coating was initially developed for application on military weapons (U.S. Navy Seal) where there was a need for a material that would withstand extreme adverse weather conditions; the coating needed for example to withstand more than 500 hours in 5% salt spray and still meet the military machine gun firing requirements. It is a thin hard coating that provides excellent protection from abrasion as well as the action of natural and chemical elements. Compared with traditional surface coatings for metals (such as blueing, phosphate coating, etc.), Gun Kote has an unrivalled resistance to wear. It does not attract dirt or dust, has excellent impact resistance and can also be formulated to be non-reflective.

Pre-treatment - The coating application must be preceded by a pre-treatment phase, taking care not to use glass micro spheres for sandblasting. For stainless steel, the following is envisaged: sand blasting, if possible using corundum sand or aluminium oxide sand with a 120 mesh, at 5 atm of pressure.

Application - Gun Kote is formulated as ready-to-spray. If thinning is required, use methyl ketone or ethyl alcohol in small amounts. To clean up the product, use acetone before it has dried completely. Once the product is completely dry, the only way to remove Gun Kote is sandblasting with aluminium oxide (or corundum sand).

Gun Kote helps dissipate heat more quickly on the parts treated with this coating. It withstands continuous temperatures as low as -130°C up to over 300°C without losing its special characteristics.

A few examples of its uses: Exterior of any weapons, from handguns to naval artillery - Coating of knives, both as an anti-corrosion treatment as well as for aesthetic appeal - Engine blocks, exhaust manifolds and exterior of brake callipers to improve heat dissipation.

Main tests performed on Gun Kote with positive results: Thermal stability - Fluid resistance - Corrosion resistance - Impact resistance - Dielectric resistance - Abrasion resistance.

Distributor in Italy: Grande Armeria Camuna Snc - Via Nazionale 45 - I-25050 Niardo BS, phone +39 0364 339387, fax +39 0364 1955146, info@armeriacamuna.it, www.armeriacamuna.it / **Authorised application plant in Italy:** Brugar Snc - Via Matteotti 303 - I-25063 Gradone Val Trompia BS, tel. +39 030 8912467, fax +39 030 8916112, brugar@intred.it

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SAFETY IS STAINLESS STEEL AT THE VERONA ARENA (All'arena di Verona la sicurezza è inox)

The great Roman monument, the symbol of the city, dates back to the first half of the 1st Century AD and since 1913, it has been known throughout the world as the most important open air opera theatre, accommodating up to 22,000 spectators. Recent restoration work involved the construction of new covering for the central pit, where the orchestra sits, the underground room and the underground sewage tunnels, following the replacement of previous reinforced concrete structures.

Consequently, the new covering slab for the "large central pit" made of 24 cm thick reinforced concrete was built, with a main span of 11.5 m, supported in its structural function by a system of roof struts and post tension tie rods which minimises strains and deformation owing to the acting loads. The post tension system used, comprising stainless steel bars, goes under the name of GEODINOX QT 850 and it guarantees the structural safety, quality and durability of the installation, helping the new structures comply with current legislation.

The types of stainless steel used are: martensitic EN 1.4057 (AISI 431) and austenitic EN 1.4301 (AISI 304) and EN 1.4401 (AISI 316).

Client: Comune di Verona / **Works manager:** Ing. Sergio

Menon, dirigente del Cdr edilizia pubblica del Comune di Verona / **Designer:** Prof. Ing. Claudio Modena, SM Ingegneria Srl - Via dell'Artigianato 7 - I-37060 Caselle di Sommacampagna VR, phone +39 045 8581711, fax +39 045 8589182, info@smingegneria.it, www.smingegneria.it / **General Contractor:** Costruzioni Bellè Srl - 37135 Verona - Via Trieste 22, tel. +39 045 501005, fax +39 045 585012

Post tension system manufactured by: GeodaG Sistemi Srl, Dr. Fulvio Carrubba - 24020 Gorle BG, tel. +39 035 340771, fax +39 035 4534991, info@geodag.com, www.geodag.com

System Qualification: Politecnico di Torino Dip. Ingegneria Strutturale e Geotecnica / **Stainless steel elements manufactured by:** Acciaierie Valbruna - 36100 Vicenza - Viale della Scienza 25, tel. 0444.968211, fax 0444.963836, info@valbruna.it, www.acciaierie-valbruna.com / **Cogne Acciai Speciali SpA** - 11100 Aosta - Via Paravera 16, tel. 0165.3021, fax 0165.43779, info@cogne.com, www.cogne.com

CENTRO INOX TEACHING IN UNIVERSITIES (Attività didattica del Centro Inox nelle Università)

Since 2006, on the proposal of the President of Centro Inox, Eng. Giuseppe Marzorati (Cogne Acciai Speciali Terni, Aosta) it was decided that a proper training schedule needed to be programmed, with lessons, seminars and practicals, held by engineers from Centro Inox in Italy's finest universities offering Engineering and Architecture degree courses.

Records of considerable success were noted for participation and interest in the encounters already held at the Milan Polytechnic and the Universities of Genoa and Palermo; for 2007, a large number of contacts with the major universities all over Italy are scheduled, to define the work to be done, which will also involve participation in some Master's courses.

With this activity set to continue in future, Centro Inox aims to fill those cognitive voids that often make stainless steels almost unknown materials, deemed, wrongly, to be difficult to process and of limited use. Many future designers, knowing in-depth the properties of both traditional stainless steels and new generation alloys, will have the necessary tools to use them correctly and in the best possible way, also for emerging structural usages which will open up new application opportunities still unknown at present.

"MADE IN STEEL" - 2nd EDITION - BRESCIA, 22nd - 24th March 2007

Following the success of the first edition of this show held in Brescia from 15th to 17th September 2005, Siderweb.com, the steel and iron industry portal, has organised a larger and more international 2007 edition. Centro Inox, among the sponsors of the event, will be exhibiting with its own stand, representing all the Associated companies and their production programmes.

Over the course of the three days, conferences, forums and round tables will take place alongside the exhibition.

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WHEN SCIENCE BECOMES A GAME

(Quando la scienza diventa gioco)

It is now quite common to see playgrounds equipped with structures which, through the use of the senses, provide stimuli for play activities and the neuropsychomotor development of children, with particular regard to the needs of children with motor, sensory or cognitive development handicaps.

As for normal play equipment, in this case the choice of stainless steel is also found to be advisable due to its durability, minimal maintenance and the absence of dangerous features (swarf, shards, rust) which could injure the little users.

The examples illustrated are made with EN 1.4301 (AISI 304) stainless steel but the choice switches to EN 1.4401 (AISI 316) for installations in seaside areas. The surface can have a satin finish or electrolytic polish.

Fig. 1 - The "Island of Sensations", in Patria Park in Alessandria. Fig. 2 - The "Overhead ear" captures and amplifies the surrounding noise. (City of Alessandria). Fig. 3 - Two large stainless steel dishes, placed some distance apart, transmit the sounds. Fig. 4 - The "Pan Pipes" emits sounds, vibrations, frequencies and resonances. Fig. 5 - Oscillating revolving swing.

Structures made by: Modo Srl - Via Villafranca 34 - I-35010 Campodoro PD, phone +39 049 9065385, fax +39 049 9065911, info@modoarredo.com, www.modoarredo.com / **Design:** tobia.reposi

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