

INOSSIDABILE

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Summary

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A DUPLEX ARCH FOR THE NEW MALIZIA BRIDGE IN SIENA

(Un arco duplex per il nuovo ponte di Malizia, a Siena)

The project for the reconstruction of the Malizia bridge arose both from the need to improve the flow of traffic and that of inserting an element into the landscape which was architecturally qualifying for the town of Siena (Fig. 1).

A functional and technologically innovative solution for a bridge which will cross over the vast railway seat below was found in the construction of a large arch, positioned between the two previously built carriageways (Fig. 2).

Uranus 35N duplex stainless steel was chosen for the construction of the arch, made up of 5 segments of welded tube, with an external diameter of 820 mm, obtained from plates with a thickness of 35 mm and width of 2,480 mm, supplied simply pickled.

The segment tubes of the arch, each 10,700 mm long, were brake formed and joined longitudinally by submerged arc welding. A second brake forming process gave the elements their correct curvature. Lastly, the connections for the hangers were then inserted and welded (Fig. 3).

The external surface was shot-blasted using grit and protected by means of adhesive plastic.

The five elements were pre-assembled (with welding) on site and subsequently hoisted onto a temporary pier (Fig. 4). After the geometry of the structure had been checked, the final welds were carried out.

The joints made on site were obtained by means of electrode welding (Fig. 5).

Once assembly was complete, any damaged or welded parts were repaired on site, again using shot-blasting.

The arch and the deck were finally connected by means of hangers.

■ Client: Comune di Siena

■ Final project and RUP: Ing. Raffaello Fontani, Comune di Siena

■ Architectural project: Arch. Paola D'Orsi, Comune di Siena

■ Executive project and management of works: Ing. Pierangelo Pistoletti - Seteco Ingegneria Srl - Corso A. Saffi 1/C int. 15 - I-16128 Genova, phone +39 010 585838, fax +39 010 585904, ufficiotecnico@setecogec.it

■ Production and installation: Costruzioni Cimolai Armando S.p.A. - Via Ungaresca 38 - I-33170 Pordenone, phone +39 0434 5581, fax +39 0434 361401, info@cimolai.com, www.cimolai.com

■ Duplex plates supplied by: Industeel Italia Srl - Gruppo Arcelor - Piazza Sant'Ambrogio 8/A - I-20123 Milano, phone +39 02 72000544, fax 02 72022380, industeelitalia@libero.it

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RENOVATION OF THE TUNNELS OF THE VICENZA BYPASS

(Ristrutturazione delle gallerie della tangenziale di Vicenza)

Four tunnels of the new Vicenza bypass have been renovated by applying a supplementary load-bearing coating in stainless steel over a length of 1.446 m.

The calotte - The load-bearing substructure is made up of Omega-shaped profiles in EN 1.4301 (AISI 304) stainless steel, measuring 80 x 45 x 2, pre-drilled and installed longitudinally at a distance of approx. 2.00 m from one another and fixed to the underlying concrete coating by means of threaded bars in EN 1.4301 (AISI 304) stainless steel with a diameter of 12 mm, equipped with stainless fasteners. The coating of the calotte of the tunnel, over a

length of approx. 12.50 m, was made in EN 1.4301 (AISI 304) corrugated sheets with a 27.5 x 76 profile and thickness of 0.5 mm, laid orthogonally to the axis of the tunnel and fixed to the underlying load-bearing substructure by means of screws and rivets in EN 1.4301 (AISI 304) stainless steel.

The piers - The underlying substructure is composed of Omega-shaped EN 1.4301 (AISI 304) profiles, measuring 80 x 45 x 2 mm, pre-drilled and levelled. These are installed vertically at a pitch of 1,230 mm and fixed in place by means of threaded bars equipped with EN 1.4301 (AISI 304) fasteners. The coating of the side walls of the tunnels, to a height of 2.0 m, is made up of composite panels in light-coloured porcelainized steel (external), coupled with a stainless steel sheet with a 1-mm thickness (internal). Overall, a total of 20,700 m² corrugated stainless steel sheets and a length of 9,950 m of stainless steel profiles were used. 11,450 threaded bars with dowels and 22,900 stainless steel nuts and washers for used for anchoring.

The system provided substantial advantages in terms of cost, speed of construction, use of thin gauges, absolute tightness, resistance to atmospheric agents, energy savings and safety for users.

■ Performance of works: Associazione Temporanea di Imprese Edilisc Srl - Via F.lli Cervi 1/D - I-20063 Cernusco sul Naviglio MI, phone +39 02 92142506, fax +39 02 92106475, edilisc@tin.it / Technical Spa - Via Ugo La Malfa 76 - I-25050 Provaglio d'Iseo BS, phone +39 030 9883191, fax +390 30 9882599, technical@technicalsr.it

■ Corrugated sheet: Alubel Spa - 42011 Bagnolo in Piano RE - Via Torricelli 8, tel. 0522.957511, fax 0522.951069, alubel@alubel.it, www.alubel.it

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FROM OUR MEMBERS

S.A.M.A.: COLD-TRANSFORMED SPECIAL STEELS

(Dalle Associate. S.A.M.A.: acciai speciali trasformati a freddo)

The company S.A.M.A. S.p.A., founded in 1973 has, throughout this time, always played an important role in the production of special steels in a variety of different work methods (see Table. 1). The company has always pursued the goal of making investments with the aim of improving the production and control systems; the commercial structures have also been strengthened through the creation of branches complete with warehouses for stocking finished products, in order to remain as close to the market and to the needs of its customers as possible. Different kinds of special steels have been introduced along the way and, currently, the production programme is divided as indicated in graphs 1, 2, 3 and 4.

The various products are supplied in compliance with national and international standards and, moreover, approximately 20% of the company's products are supplied in compliance with the specifications of supply given by its customers. S.A.M.A. currently has three production units capable of producing in collaboration, in order to better fulfil the quality and service requirements set forth by the market. The global market, in fact, demands extremely short reaction times and safe and certain answers. Today, this represents one of the fundamental aspects of competitiveness, i.e. **efficiency**. It is in fact useful to remember that a large percentage of the products made by S.A.M.A. is destined to the car industry and that each of the families of special steel produced by S.A.M.A. involves its own particular problems, which must all be faced and resolved entirely because this is what the market and its clientele expect.

Drawn coils - These are primarily destined to the following sectors: A) Mechanical work processes (automatic steels - stainless steels) - B) Cold-forming of screws and bolts / special pieces according to drawing (carbon steels, special

steels for hardening and tempering and casehardening - stainless steels) - C) Parts for bearings (automatic steels - steels for hardening and tempering - steels for bearings) - D) Household items (stainless steels). The production cycles are mainly as follows: 1) rolled coil → preparation → drawing of the coil → testing 2) rolled coil → preparation → drawing of the coil → preparation → heat treatment → testing → drawing of the coil → testing.

The definition of the work cycles and of the heat treatments which best ensure the correct degree of homogeneity are the points for which the great degree of experience of a producer are essential, in that it is only from the care with which the operations involved in preparing the wire that the requirements set forth by the customer can be fulfilled; the production cycles of the pieces obtained from wire are, in fact, much more complex compared to the production cycles used by clients for the transformation of bars.

In order to achieve the right "mixture" of these elements, it is therefore necessary to know how to blend professionalism, tradition and innovation, in that the market is in constant evolution.

■ Production and Sales: S.A.M.A. Spa - Via Regone 54 - I-20078 S. Colombano al Lambro MI, phone +39 0371 29.05.1, fax +39 0371 89.86.94; Sales: Via Leopardi 7/d I-22036 Erba CO, phone +39 031 333.65.11, fax +39 031 611.723, info@samainox.it, www.samainox.it

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200-SERIES Cr-Mn STAINLESS STEELS: A REAL AND SAFE ALTERNATIVE TO 304?

(Acciai inossidabili serie 200 al Cr-Mn: una reale e sicura alternativa al 304?)

Premise - The variability of the price of nickel (Ni) has pushed a number of producers to search for an alternative for the production of austenitic stainless steels having similar characteristics to those of AISI 304. During the early '30's, the first chrome (Cr) and manganese (Mn) austenitic stainless steels were produced, in which the latter element partially replaced the percentage of Ni. Increasingly specific formulae were then studied over time, making use of nitrogen (N) and copper (Cu) and keeping the presence of carbon (C) and sulphur (S) under control, elements which strongly influence the performance of these materials.

The use of stainless steel of the 200 series was particularly successful in India, where specific applications were identified in which it was possible to replace the 304 without danger. On the contrary, in other countries, materials of the 200 series with barely controlled percentages of S and C were placed on the market, with the risk of damaging the end users and the image of stainless steel.

Table 1 indicates the chemical compositions of some 200 series stainless steels.

Resistance to corrosion and workability - Figure 1 illustrates the values of density of current recorded for some kinds of stainless steels (J1 and J4 are 200 series steels). Resistance to pitting is strongly influenced by the chrome content, as well as by the sulphur one. Figure 2 also underlines the evident difference in behaviour of the Cr-Mn materials compared to 304.

Similar considerations can be made by observing the pH values of depassivation in Figure 3.

Figure 4: the clear difference in behaviour between the 304 and the Cr-Mn types is made evident by the results of the tests of exposure to saline mist.

Figure 5: Cold-formability: tests have demonstrated a certain tendency towards the formation of martensite, particularly when the percentages of nitrogen and carbon are reduced with the aim of lowering mechanical resistance. Above all, the 200 series stainless steels, with Ni content between 1 and 4%, are rather susceptible to cooling cracks following operations of deep-drawing (delayed cracking).



Conclusions - The partial or almost total replacement of nickel with manganese (and nitrogen) makes it possible to produce austenitic stainless steels with lower nickel content. A chrome content of 18% is not compatible with low nickel values, without ferrite forming; for this reason, the chrome content in steels of the 200 series is reduced to 15-16% and, in certain cases, to 13-14%, making their resistance to corrosion incomparable to that of 304 and other similar steels.

Moreover manganese and, in certain cases, also copper slow down repassivation under conditions of acidity typical of the corroded zones under deposit areas and in the crevices. The speed of dissolution of Cr-Mn steels under these conditions is approximately 10 to 100 times higher compared to 304.

Moreover these materials are often produced in plants in which it is not possible to control the residual levels of sulphur and percentage of carbon, the traceability of the material becomes impossible and, as a consequence, even in the recycling of the material, Cr-Mn steel can, if not declared, become a source of a dangerous mix of scrap which generates castings unexpectedly rich in manganese.

These steels must not, however, be "exchanged" or "mistaken" for those of the 300 series, which have completely different degrees of performance as far as resistance to corrosion is concerned, also considering that, a valid alternative can be found in the ferritic 400 series. This applies both for the material of origin such as sheets, strips, tubes, bars, etc., but also for finished products such as screws, nuts and bolts, flanges, valves, etc. which have started to be sold without a precise identity or even, in certain cases, with a false identity (refer to the article published in "Il Sole 24 Ore" on 5.11.2005.).

To this regard, Centro Inox, in collaboration with a company specialising in non-destructive tests (NDT), has formulated a reagent which is sensitive to the presence of manganese, in order to be able to quickly recognise whether an austenitic steel belongs to the 200 series or to the 300 one.

The technical notes contained in this article were drawn from the report "The new 200-series: an alternative answer to Ni. surcharge? Risks or opportunities" presented by Dr. Jaques Charles (U&A Arcelor) during the "5th European Stainless Steel Science and Market Congress" held in Seville from September 28th to 30th 2005.

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ANTI-PERFORATION STAINLESS STEEL INSOLES (Solette inox antiperforazione)

There are truly a large number of work environments in which special accident-prevention shoe-wear is used: any place in which there is the risk of weights falling, aggressive liquids spreading, cutting or protruding objects, there is the need to suitably protect the workers. A large number of models is available, to satisfy all needs for protection, but also comfort and elegance.

In particular, as far as the danger behind nails, sharp points, sheets, blades and anything else which is capable of perforating a normal shoe is concerned, insoles in EN 1.4310 (AISI 301) stainless steel are used, which are also painted with primers and epoxy resin to increase the adherence between the sole and the underfoot into which they are inserted. These insoles are obtained from strips with a thickness of 0.42 - 0.43 mm by means of blanking and must withstand the perforation test performed using a nail dedicated to the purpose and exerting a force of approximately 1,100 N to approximately 110 kg, according to the standard UNI EN 12568 "Foot and leg protectors - requirements and test methods for toecaps and metal penetration resistant inserts".

Moreover, all the anti-perforation sheets used in shoe-wear for professional use must fulfil the following fatigue strength requirement: no sign of breakage when subjected to 1×10^6 cycles of flexure (1,000,000 bends), according to the EN ISO 20345 standard "Personal protective equipment - Safety footwear", which establishes the requirements of safety shoe-wear for professional use against the foreseeable risks involved in various work environments.

Coils supplied by: Thyssenkrupp Acciai Speciali Terni Spa - Viale B.Brin 218 - I-05100 Terni - Sales: Mr Garbarino, phone + 39 335 6521189, bruno.garbarino@thyssenkrupp.com - Marketing: Dr.ssa V. Fontana, phone +39 0744 490867, fax +39 0744 490879, valeria.fontana@thyssenkrupp.com, www.acciaitermi.it

Production: Industrie Calzature Srl - Almar Group - Via Borgomanero 50 - I-28040 Paruzzaro NO, phone +39 0322 539111, fax +39 0322 539156, almaritalia@almargroup.com, www.almarshoes.com

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ANTI-LEGIONELLA COILS FOR BOILERS (Serpentina anti Legionella per bollitori)

Due to their horizontal conformation, the traditional removable heat exchangers in boilers do not transmit sufficient heat to the water sitting on the bottom which, as a consequence, merely remains warm.

As one knows, the bacteria belonging to the various species of Legionella find excellent conditions in which to reproduce at temperatures which, approximately, lie between 20 and 45°C. It is therefore important that, in order to hinder the proliferation of bacteria, the temperature in hot-water production systems remains steady and never falls below 45 - 50 °C.

A pipe bundle in molybdenum austenitic stainless steel, EN 1.4404 (AISI 316L), was thus conceived, with a low carbon content and with a special sloping downward conformation (Fig. 1), which makes it possible to heat the entire volume of water and, in particular, also that in the bottommost layers (Fig. 2).

As well as making it possible to use boilers with a smaller capacity for exactly the amount of hot water desired, this also allows for savings on the cost of the product itself.

Lastly, the anti-Legionella coil improves the electric insulation of the heat exchangers and, as a consequence, the operation of the anti-corrosion devices.

Production: Cordivari Srl - Z.I. Pagliare - I-64020 Morro d'Oro TE, phone +39 085 80401, fax +39 085 8041418, info@cordivari.it, www.cordivari.it

CONTINUING ON THE THEME OF SAFETY: "BANISTERS"

(Sempre in tema di sicurezza: "i parapetti")

"Systema inox" is a series of prefabricated elements in EN 1.4301 (AISI 304) or, on request, in EN 1.4401 (AISI 316) stainless steel with which it is possible to build balustrades and traditional, modern or "deco" banisters.

Assembly is quick and easy, thanks to the system by which pieces are joined together and to a vast range of accessories: corners, anchoring plates, end pieces and supports for handrails. A number of products which facilitate assembly complete the range such as, for example, anaerobic blocking elements for screws and for coupling fittings.

As well as the properties of stainless steel, including no need for maintenance, resistance to corrosion, long-life and a pleasing appearance, an excellent degree of versatility and simplicity of assembly are also obtained by means of this technology, all to the advantage of the costs of construction.

Production: Ind.I.A. Industria Italiana Arteferro - Via Vicenza 6/14 - I-36034 Malo VI, phone +39 0445 580580, fax +39 0445 580874, india@arteferro.com, www.arteferro.com

NEW MAGIC WITH STAINLESS STEEL AT THE FESTIVAL IN LODI VECCHIO

(Nuova magia con l'inox alla festa di Lodi Vecchio) For the third year in a row (refer to the article in Inossidabile 158, December 2004), the Luciano and Ernesto Dellavia brothers contributed to the annual San Fermo Festival, held last August in Lodi Vecchio, near Lodi, with a fountain in stainless steel. Nature, in its most fanciful forms, was this year's theme: roses, butterflies and, on the peak, a stork with its little ones snuggled in their nest.

The construction was 4.80-metre high, with a diameter or 3.30 m, built entirely with 3-mm thick work scraps of EN 1.4301 (AISI 304) stainless steel sheet. The structure was made up of six cylinders and 3 half-cylinders with different diameters, assembled by means of microplasma welding, onto which the laser-cut and subsequently bent figures were bolted.

A hedge of plants, held within pots also coated with scraps of stainless steel sheet, surrounded the fountain.

Realization: Delinox - Viale Europa 38 - I-26855 Lodi Vecchio LO, phone +39 0371 753750, fax +39 0371 464621, info@delinox.it, www.delinox.it

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ADVANCED MODULAR "STAINLESS STEELS" COURSE

(Corso modulare avanzato "Gli acciai inossidabili") 6th edition - Milan, Palazzo FAST, Piazzale R. Morandi 2 Organized by the Associazione Italiana di Metallurgia together with Centro Inox and sponsored by Assofond and

Federacciai

1st module: metallurgy, characteristics, corrosion, production and market of stainless steels, 25-26 January and 1-2-8-9 February 2006

2nd module: machining, installation, selection and design criteria, applications of stainless steel, 7-8-14-15-21-22 June 2006. The detailed program of the second module lessons will be presented in issue 163 of Inossidabile (March 2006).

The course is held in Italian.

For information and registration: Course Secretariat - Associazione Italiana di Metallurgia (AIM) - Piazzale Rodolfo Morandi 2 - I-20121 Milano - phone +39 02 76021132 / 76397770 / 76397763, fax +39 02 76020551, aim@aimnet.it, www.aimnet.it

MINISTERIAL DECREE 14.9.2005 "TECHNICAL STANDARDS FOR CONSTRUCTIONS" (Decreto Ministeriale 14.9.2005 "Norme tecniche per le costruzioni")

The ordinary supplement no. 159 by the Ministry of Infrastructures and Transport regarding M.D. 14.9.2005 was published in the Official Gazette of the Republic of Italy no. 22 on 23.9.2005, which contains the indications concerning the design of constructions and the type approval of the products used therein and which will replace M.D. 9.1.96.

In particular, paragraphs 11.2.2.9.1 and 11.2.4.7 contain specific indications regarding the stainless steels destined for use in rods for reinforced concrete and in metal structures, respectively.

THE NEW CENTRO INOX WEB SITE

(Il nuovo sito web del Centro Inox)

The Centro Inox web site has undergone a restyling operation which has made it richer in news and easier to consult: www.centroinox.it

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PUERTA AMÉRICA HOTEL: A DREAM COME TRUE

(Hotel Puerta América: un sogno divenuto realtà)

The Puerta América Hotel was recently opened in Madrid, a five-star hotel with 342 rooms spread over 12 floors. Nineteen of the best architects and designers of the world took part in its construction, with the aim of creating a unique place in which architecture and art blend together.

Each floor is completely different from the others, being built and furnished according to a particular theme and style unique to each designer: atmospheres which are warm or high-tech, minimalist or cosy, relaxing or stimulating.

On the fourth floor, the architects Eva Castro and Hoger Kehne of Plasma Studio used triangles of stainless steel, to achieve a three-dimensional effect. In the corridor, geometric stainless steel elements, illuminated by a play of different coloured lights, embrace guests as though they were inside a space ship (Fig. 1). In the suites, additional sculptures in steel (Fig. 2) complete the furnishing and, in all the rooms of the floor, stainless steel was used again for the support bases of the beds and the headboards (Fig. 3). In the bathrooms, the basins, the baths (combined with glass) are also in stainless steel, as are the dishes and walls of the showers (Fig. 4).

All of the steel used is EN 1.4401 (AISI 316) with Scotch Brite glazed finish, with a 2-mm thickness for the floors (with sound-absorbing supports) and 1.2-mm thickness for the triangles in the coating (supported by panels of fire-proof wood), all of which is treated with anti-fingerprint paint.

Realization of the project: (hall, corridors, rooms and bathrooms): Bluestein - Via Lecco 457 - I-24030 Pontida BG, phone +39 035 4385404, fax +39 035 4385521, info@bluestein.it, www.bluestein.it

Project: Architects Eva Castro e Hoger Kehne, Plasma Studio - 8 Andrews Road - Unit 51, Regents Studios - London E8 4QN UK, phone +44 (0)20.7812 9875, fax +44(0)870 705 1838, info@plasmastudio.com, www.plasmastudio.com

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