

# INOSSIDABILE

Edited and published by Centro Inox Servizi S.r.l.

## Summary

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

### COVER PAGES 3-4

#### WATER: A PRECIOUS ASSET FOR EVERYONE

(Acqua: un bene prezioso per tutti)

The "PubblicaPrivata" work was born from the artist's intuition. Having a dimension of 6,700x1,000x200 mm, the work is the result of a careful observation of Val Camonica, its mountains and the river Oglio that runs from Ponte di Legnolino to Lake Iseo with its hydroelectric power plants and dams. The artist took two big words, Pubblica (Public) and Privata (Private), inserting them in the bed of the river Oglio in Temù (BS). He used two materials which initially were aesthetically similar but with different characteristics, which would have emerged over time. The choice of the artist? Carbon steel and stainless steel, which look very similar when just polished but they react differently with moisture and in contact with water. Carbon steel oxidises and creates corrosion products (iron oxides), deteriorating over time. Stainless steel does not corrode and maintains its initial brilliant appearance. The artist used EN 1.4301 (AISI 304) stainless steel sheets, size 1,250x2,500 mm, obtained through laser cut, TIG welded on the external side.

**Artist:** Stefano Boccalini – Via Tartaglia, 7 – I-20154 Milano MI, phone +39 335 6553559, [sboccalini@gmail.com](mailto:sboccalini@gmail.com), [www.stefanoboccalini.com](http://www.stefanoboccalini.com) / **Made by:** DUCOM di Duicoli Giovanni – Via dell'Artigianato, 23 – I-25050 Niardo BS – phone and fax +39 0364 335044, [info@ducomdesign.com](mailto:info@ducomdesign.com), [www.ducomdesign.com](http://www.ducomdesign.com) / **Customer:** Distretto Culturale di Valle Camonica – Piazza Tassara, 3 – I-25043 Breno BS – phone +39 0364 324011, [distrettoculturale@cmvallecamonica.bs.it](mailto:distrettoculturale@cmvallecamonica.bs.it), [www.vallecamoniacultura.it](http://www.vallecamoniacultura.it) / **Photos:** S. Serretta, G. Azzoni

### PAGE 5

#### STAINLESS STEEL BICYCLE: STRONG, LIGHT, BUT ABOVE ALL... CUSTOMIZED (Bicicletta inox: resistente, leggera, ma soprattutto... su misura)

The example shown in the article with stainless steel as the focus is interesting, not only for the remarkable originality, but for the study and the production process adopted. Using stainless steel to realise a bicycle frame could seem a contradiction, due to its considerable specific weight characterizing this material with respect to other materials such as aluminium, titanium alloys or carbon fibres. However, the total weight is absolutely "competitive." The processing involves the laser "drilling" of the stainless steel. This guarantees a sequence of full and empty sections to provide adequate rigidity and robustness. But there's more! The designer wanted these limited edition bicycles to be tailor-made for customers. This was allowed by the extreme versatility characterising the stainless steel (in this case EN 1.4301/AISI 304) and the fact it can be specially moulded for an increasingly demanding and elitist public.

**Design:** Tobias Knockaert – Industrial Designer @ Eleventyseven, Innovation Engineer @ D'Haene – Brugge – Belgio – [www.eleventyseven.be](http://www.eleventyseven.be), [www.dhaene-nv.be](http://www.dhaene-nv.be) / **Made by:** V.A.C. MACHINES nv/sa – Brugge – Belgio – [www.vac-machines.be](http://www.vac-machines.be) / **Employed laser machines:** TRUMPF GmbH – [www.trumpf.com](http://www.trumpf.com)

### PAGES 6-7

#### FROM OUR MEMBERS UGIMA®-X, STAINLESS STEEL FOR EXTREME WORKABILITY

The use by industry and consumers of stainless steel is constantly growing (from 2% to 4% depending on

the years). Stainless steel long products are among the most difficult to work. Historically, the first solution used by the steel industry to improve the workability of stainless steel was the addition of sulphur. This allowed the users to have a better chip fragmentation. The addition of sulphur was advantageous in terms of chip fragmentation: nevertheless, it presents a disadvantage for stainless steel as it weakens its corrosion resistance, in addition to the worsening of hot and cold deformation behaviour, and a loss of weldability. To overcome these disadvantages,

in the early 90s, Ugitech found a way to improve the workability of its stainless steel significantly, without deteriorating other properties. To overcome these disadvantages, in the early 90s, Ugitech found a way to significantly improve the workability of its stainless steel, without deteriorating other properties. It introduced metal oxides which, when they are well controlled in composition, improve the stainless steel workability. This workability enhancement, developed by Ugitech for 30 years, consisted of controlling the inclusions of oxides, by adding small quantities (a few dozen ppm) of alkaline elements to the metal. The pictures in the article show chips obtained through the machining, under the same conditions, of two EN 1.4301 (AISI 304) stainless steel products characterized by non-controlled oxides and UGIMA® oxides, respectively. For the last 30 years Ugitech has been at the side of the turners in order to get the best results from the workability performance of UGIMA® and UGIMA® HM (the improved version of UGIMA® introduced on the market in 2006) and Ugitech has developed some performance measures for each of its castings. Ugitech has worked to improve the reproducibility of the UGIMA® oxides composition to reduce the dispersion of machining performance from one casting to another. After two years of research, a new liquid metal treatment process has improved the average performance of the castings and reduced the dispersion between castings. The castings obtained through this process created the UGIMA®-X products. With the new range of UGIMA®-X 4404, the average cutting speed goes from 238 m/min to 269 m/min. But what is even more interesting for users, is that from UGIMA® 4404 to UGIMA®-X 4404, the minimum cutting speeds vary from 200 m/min to 242 m/min, with an increase of more than 20% in the productivity.

To date, Ugitech has developed the manufacture of UGIMA®-X 4404 and UGIMA®-X 4305. When UGIMA®-X 4307 will be perfected by the end of the year, Ugitech will launch a new range of UGIMA®-X that covers the three most popular qualities used by turners. Using the UGIMA®-X qualities, the turners can work faster and benefit from the advantages of modern lathes. Ugitech will launch the UGIMA®-XD steel products made up of UGIMA®-X bars having improved straightness, with values lower than 0.5 mm/m guaranteed by a check on each of the bars. Thanks to the absence of vibrations and the possibility of having precise ends when turning, users can get the best out of their work centres, combining an impeccable surface with limited tool wear thanks to the quality of the UGIMA®-X oxides. The diameter range covered by UGIMA®-X and UGIMA®-XD bars ranges from a diameter of 4 mm for the smaller to 80 mm for the larger.

Ugitech is part of SCHMOLZ + BICKENBACH Group and its products are available through the SCHMOLZ + BICKENBACH Italia Srl and SCHMOLZ + BICKENBACH AcciaiSpeciali

### PAGES 8-9-10

#### NITRIDING OF STAINLESS STEEL (La nitrurazione degli acciai inossidabili)

**Introduction** - Nitriding is a thermochemical treatment of surface hardening that allows the

modification of the mechanical, chemical and tribological characteristics of ferrous and non-ferrous alloys, concerning above all carbon steel. The nitriding process involves the penetration of atomic nitrogen, N, through the metal surface and its diffusion into the steel crystal lattice. The atomic nitrogen can be generated from the dissociation of ammonia at high temperatures. This process is called gaseous nitriding. Otherwise, it can be obtained from the dissociation of molecular nitrogen by the exploitation of the high energies characterizing plasmas, i.e. ionized gases obtained by means of strong electromagnetic fields. This is called ionic nitriding.

**Stainless steel nitriding** – Stainless steel has excellent resistance to corrosion and it can be also used in specific applications where high superficial hardness is required. Although nitriding has been applied for decades, there has been a growing interest in the development of ionic nitriding of stainless steel components. It is known that nitrogen, presenting a greater affinity to chromium with respect to iron, subtracts free chromium from the metallic matrix by combining with it and forming chromium nitride. This matrix depletion does not allow the formation of chromium oxide, which is a fundamental compound since it generates a thin layer, in the order of few microns, which passivates the stainless steel surface. This avoids any interactions with the external environment and drastically mitigates corrosion. The choice of the process parameters is extremely important in order to not compromise the excellent stainless steel corrosion resistance.

**Hardness and corrosion resistance experimental tests** - The TTN group has been developing stainless steel nitriding processes for years by using both traditional and innovative ionic nitriding systems; the latter ones are characterized by a different plasma generation method, being localized. The maintenance of the stainless steel anti-corrosive properties combined with the increase in the surface hardness requires a good sense in the choice of process parameters. Ionic nitriding greatly facilitates the management of the abovementioned parameters allowing a more precise control of the final characteristics, which are further improved by operating with a localised plasma nitriding. Corrosion resistance was assessed by characterising the substrates before and after the treatment by means of cyclic potentiodynamic polarisation tests. Surface hardness tests were performed by metallographic and Vickers microhardness tests. The obtained results show a general increase in hardness after the treatment, with values strictly correlated with the operating parameters and the nature of the substrate. However, corrosion tests show a deterioration in the corrosion resistance of treated nitrided steel compared to the untreated ones. The intensity of this deterioration was closely related to the microstructure of each sample and the process conditions. Further analyses performed by X-ray spectroscopy (XRD) allowed the evaluation of the properties of the phases that are formed during the treatment.

**Conclusions** - The ionic nitriding process, going to considerably increase the surface hardness of stainless steel, can be accompanied by a generalised sensitisation of the substrate microstructure with consequent reduction of the corrosion resistance. The results closely depend on the treated material and require a preliminary study and an accurate selection of the parameters on the basis of the substrate. The decrease in anti-corrosive properties mainly derives from the precipitation of chromium nitride, which is higher during high temperature treatments and for longer times. By carefully adjusting the treatment parameters, the ionic nitriding allows good results by working on pieces of any size, exceeding the results obtainable with the traditional gas nitriding.



## PAGE 11

**STAINLESS STEEL BOTTLES AND FLASKS: A SAFE CHOICE FOR THE ENVIRONMENT AND HEALTH****(Bottiglie e borracce inox: una scelta sicura per l'ambiente e per la salute)**

Whether on a picnic in the mountains or for the long days at the office, you cannot do without bottles and flasks to maintain a proper level of hydration. Common plastic containers, made of PET are handy due to their lightness. However, this material can cause health issues. PET contains bisphenol A (BPA). This organic compound has been linked to various diseases such as breast tumours and infertility. In recent years, consumers have become more aware of this and they are increasingly turning towards stainless steel. There are many advantages of choosing this alloy over plastic. Its production has a lower environmental impact, it is totally recyclable, hygienic and does not corrode in contact with drinks. In addition, stainless steel containers are very light and have excellent insulating properties.

**Producer:** 24Bottles® is a trademark of DESIGN24 s.a.s. di Melotti & C. - Via delle Fosse Ardeatine, 8 - I-40139 Bologna BO - Office: Via Bruno Tosarelli, 284 - I-40055 Villanova di Castenaso BO, [info@24bottles.com](mailto:info@24bottles.com), [www.24bottles.com](http://www.24bottles.com) / **Designer:** Luca D'Ambrosio

## PAGE 12

**PAINTING ON A METALLIC... CANVAS (Quadro su tela... metallica)**

In Vimercate, twenty kilometres from the centre of Milan, the Energy Park technological centre was established in 2009 for those companies operating in the information technology, telecommunication and advanced research areas. The anechoic chamber is located in one of the most recent buildings, and one of its distinguishing features is represented by a semi-transparent metal crown, covered with stainless steel wire mesh. The company producing the product supplied 1,300 square meters of EN 1.4401 (AISI 316) stainless steel wire mesh. What stands out is the graphic reproduction of a series of trees, made on the wire mesh through a process of digital oxidation. The tree-lined motif embellishes the structure in an unusual and elegant way, highlighting the energy saving goal of which Energy Park is the promoter.

**Producer:** Tessitura Tele Metalliche ROSSI OLIVIERO & C. s.r.l. - Via dell'Artigianato, 16 - I-22079 Villa Guardia CO, phone +39 031 480350, [info@ttmrossi.it](mailto:info@ttmrossi.it), [www.ttmrossi.it](http://www.ttmrossi.it)

## PAGE 13

**CENTRO INOX SERVIZI SRL AFFILIATES (Gli affiliati alla Centro Inox Servizi S.r.l.)**

In a world where with a simple "click" you can access any type of information, the general user can have problems in making choices especially if they operate in niche and technically well-defined sectors. Since 1995, alongside Centro Inox Association, Centro Inox Servizi srl allows "dedicated" and broad-based technical consultancy. It is possible to purchase an annual package of services which follows a well-tested programme. The most recent introduction is the "affiliation" package which provides a whole series of promotional advantages in various areas and gives the opportunity to the "affiliate" to publicise its range of products and services to the interested technical public. There are now 15 companies that have joined this initiative, all involved for various reasons in the stainless steel sector - trade, service centers, laboratories, etc. With this formula, we try to forge an ever-closer link between affiliates and the whole market of stainless steel users. To find out more about all the services offered to affiliates you can consult the site: [www.centroinox.it/affiliazione](http://www.centroinox.it/affiliazione)

## PAGE 14

**HEAT TREATMENTS FOR STAINLESS STEEL AND NICKEL ALLOYS****(I trattamenti termici per acciai inossidabili e leghe di nichel)**

16 October 2018 - 9.00 a.m., Nerviano (MI)

Hotel dei Giardini

**PROGRAMME:**

8.30 a.m. - 9.00 a.m. - Registration of participants

- **Introduction to the works: the reason for the theoretical-practical courses**

F. Capelli, P. Viganò - Centro Inox, Milan

- **Metallurgical meanings and performance requirements**

L. Cislighi, A. Magistrelli - T.T.N., Nerviano

- **Conventional heat treatments for the main families of stainless steels. Temperatures / durations/ cooling media/ atmospheres, etc.**

D. Mattavelli, A. Casagrande - T.T.N., Nerviano

*Debate - Coffee break*

- **Heat treatments for PH stainless steel/ superaustenitic and super-duplex stainless steels/ nickel alloys**

R. Bertelli, A. Norberti - Acciaierie Valbruna, Vicenza

- **Criticalities deriving from incorrect heat treatments (grain enlargement, precipitated, carbides, etc.)**

R. Bertelli, S. Bedin - Acciaierie Valbruna, Vicenza

- **Heat treatment techniques in the production of welded pipes**

S. Toscano - Marcegaglia Specialties, Forlimpopoli

*Debate - Lunch break***2.00 p.m. - Continuation**

- **Pre and post welding heat treatments: when are they useful?**

G. Garbarino - Italian Institute of Welding, Genoa

- **Surface hardening treatments: tradition and innovation (nitriding, PVD, DLC)**

M. Ferrando, T. Sanvito - T.T.N., Nerviano

- **Guided tour of the facilities at T.T.N., in Nerviano (MI)**

The course will be structured with both a theoretical and a practical-applicative part. The official language will be Italian.

**For further information:**

Centro Inox - tel. 02 86450559/69

[eventi@centroinox.it](mailto:eventi@centroinox.it), [www.centroinox.it](http://www.centroinox.it)**WATER AND STAINLESS STEEL: A WINNING COMBINATION FOR THE FUTURE (Acqua e acciaio inox: un connubio vincente per il futuro)**

ACCADUEO - BolognaFiere - 17 October 2018 - room G - "CH4" - 2.30 p.m. - 5.30 p.m.

**PROGRAMME:**

- **Introduction to the work: stainless steel is a "cheap" material**

F. Capelli, P. Viganò - Centro Inox, Milano

- **Hydraulic characterisation of stainless steel pipes**

E. Orsi - Polytechnic University of Milan, Milan

- **Stainless steel and the integrated drinking water cycle**

R. Savarino - C.d.I. Consulenze di Ingegneria, Pavia

- **The corrosion of stainless steel in water services: the behaviour of welded joints**

M. De Marco - Italian Institute of Welding, Genoa

- **What is happening in the rest of the world: the examples of Tokyo and Taipei**

B. Van Hecke - Nickel Institute, Brussels

The meeting will take place during the ACCADUEO exhibition. Centro Inox will be present for the entire duration of the event with a stand. The official language will be Italian.

**For further information:**

Centro Inox - tel. 02 86450559/69

[eventi@centroinox.it](mailto:eventi@centroinox.it), [www.centroinox.it](http://www.centroinox.it)[www.accadueo.com](http://www.accadueo.com)**MECHANICAL TESTS ON STAINLESS STEEL: FROM THEORY TO PRACTICE****(Le prove meccaniche sugli acciai inossidabili: dalla teoria alla pratica)**

FLASH COURSE - RTM BREDA, Carrè (VI) - 30 October 2018 - 9.00 a.m. - 1.00 p.m.

The official language will be Italian.

**For information and registration:**

Centro Inox - tel. 02 86450559/69

[www.centroinox.it](mailto:www.centroinox.it) - [eventi@centroinox.it](mailto:eventi@centroinox.it)

## PAGE 15

**FCMs (FOOD CONTACT MATERIALS) AND STAINLESS STEELS****(M.O.C.A. (Materiali ed Oggetti a Contatto con Alimenti) e acciai inossidabili)**

University of Milan - Palazzo Greppi - Sala Napoleonica - Milan - 26 November 2018 - 9.00 a.m.

In order to provide a contribution to the whole chain of companies involved in the stainless steel sector destined to the food sector (producers,

service centers, final processing firms, etc.), it was decided to organize a study day centered on FCMs (Food Contact Materials). National and European National and European Regulations and the related Decrees will be discussed, the documents to be produced, together with the compliance declaration, according to the position the interested companies assume in the abovementioned chain. There are many interconnected issues to be addressed on this issue. For example, the import of both base and already transformed products, documents or tests to be carried out in order to include a new material in the positive list, etc., should be considered. An attempt was made to examine the most important aspects, with important speakers from the academic world, Ministry of Health, relevant authorities, user companies and accredited laboratories. There are witnesses from companies which had to comply with certain obligations which are useful for the technical public that will participate.

**PROGRAMME:**

8.30 a.m. - 9.00 a.m. - Registration of participants

- **Participants welcome and introduction to the works**

F. Capelli - Centro Inox, Milan

- **Stainless steel: the ideal partner in the food industry**

R. Guidetti - University of Milan, Milan

- **National and European regulatory framework for food contact materials: regulations EC 1935/2004 - EC 2023/2006 - MD 21/03/73. The passage in order to insert a new stainless steel in the positive list**

M. Capasso - Italian Ministry of Health

- **Compliance declaration**

Italian Ministry of Health

*Debate - Coffee break*

- **Witnesses from companies belonging to the food industry chain: producers/ service centers/ processing firms). Some examples of compliance declarations**

Marcegaglia - Euro Inox - Pinti Inox

- **Penalty Decree LD 29 of 10/02/17**

Italian Ministry of Health

*Debate - Lunch break***2.00 p.m. - Continuation**

- **Import and export issues: steel product and final product (importer responsibility)**

Federacciai - Italian Revenue Agency

- **Main materials used in the food industry (some examples included in the positive list). The positive list part A and part B**

P. Viganò - Centro Inox, Milan

- **Leaching tests: experiences and witnesses from an accredited laboratory**

G. Rivolta, M. Bertoldi - RTM Breda, Vicenza

The official language will be Italian.

**For further information:**

Centro Inox - tel. 02 86450559/69

[eventi@centroinox.it](mailto:eventi@centroinox.it), [www.centroinox.it](http://www.centroinox.it)

## PAGE 16

**IMPERISHABLE ARTISTIC SIGNS (Segni artistici imperituri)**

The examples reported in the article are representative of how stainless steel can be moulded and worked on the surface according to the desire of an artist. They show the ability of austenitic stainless steel to be cold worked, thanks to the high ultimate elongation values it can reach. These qualities, together with the possibility to obtain special finishes, allowed the sculptor Helidon Xhixha, to choose for years EN 1.4401 (AISI 316) stainless steel, as the main material for his works. In the article two sculptures are reported: "Order and Chaos", made of mirror-polished stainless steel, and "Knowledge", obtained from strips and sheets of the same material with a mirror-polished finish.

**Artist:** Helidon Xhixha - [info@helidonxhixha.com](mailto:info@helidonxhixha.com), [www.helidonxhixha.com](http://www.helidonxhixha.com)

**CENTRO INOX**

The Italian Stainless Steel  
Development Association



Via Rugabella, 1 - 20122 Milano - Italy

Telephone +39 02 86450559 - +39 02 86450569

Fax +39 02 86983932

[redazione.inossidabile@centroinox.it](mailto:redazione.inossidabile@centroinox.it)[www.centroinox.it](http://www.centroinox.it)

The subscription to the quarterly **INOSSIDABILE**, outside Italy, is free of charge.