VTZ 2018

Vakuové tepelné zpracování
a tepelné zpracování nástrojů

VACUUM HEAT TREATMENT AND HEAT TREATMENT OF TOOLS

Program

20 – 21 November 2018
Hotel Alexandra, Púchov, Slovak Republic

ECOSOND ATZK IFHTSE CSNML

Odborní garanti konference
Conference chairmen

Asociace pro tepelné zpracování kovů, z.s.
Association for the Heat Treatment of Metals, z.s.

prof. Dr. Ing. Antonín Kříž
Ing. Pavel Stolař, CSc.
Ing. Filip Vráblík

Organizační výbor
Organising committee

Ing. Alexandra Musilová
(ATZK)
Ing. Lucie Podroužková
(ECOSOND s.r.o.)

Programový výbor konference
Programme scientific committee

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(STU Trnava)

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prof. Ing. Peter Grgač, CSc.
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prof. Ing. Peter Jurči, PhD.
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Ing. Miloslav Kouřil, CSc.
(VUT Brno)

doc. Dr. Ing. Pavel Novák
(VŠCHT Praha)

doc. Ing. Jana Sobotová, PhD.
(ČVUT Praha)

Ing. Jiří Stanislav, CSc.
(JST Consultancy)

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Details of payment: Conference 2018 + name of participant

www.htconference.cz

PONDĚLÍ / *MONDAY* 19. 11. 2018

17:00 – 19:00 Registration

19:00 **zasedání ATZK** / *ATZK meeting*
Alexandra Room IV

ÚTERÝ / *TUESDAY* 20. 11. 2018

8:00 **Registration**

HLAVNÍ KONFERENČNÍ SÁL / *MAIN CONFERENCE HALL*

Zahájení konference / *Opening Ceremony*

9:00 **Filip Vráblík**, ATZK President

9:05 **Overview Lectures**
Vakuum v procesech a zařízeních tepelného zpracování
Vacuum in heat treatment processes and equipment
P. Stolař, ECOSOND s.r.o, Czech Republic

9:30 **Key Lectures**
Lomová houževnatost a odolnost proti opotřebení u nástrojových ocelí pro práci za tepla ve vztahu k podmínkám tepelného zpracování
Fracture toughness and wear resistance of hot work tool steel related to heat treatment conditions
B.Podgornik, IMT, Slovakia

10:00 **Metalurgické pochopení vlivu kryogenního zpracování nástrojových ocelí**
Metallurgical understanding of the effect of cryogenic treatment of tool steel
M. A. J. Somers, Technical University of Denmark, Denmark

Tepelné zpracování nástrojů
Heat treatment of tools and tool steels

Chairpersons: **Jana Sobotová** – Czech Technical University in Prague
Peter Jurči – Slovak University of Technology in Trnava

10:40 **Vliv kryogenního zpracování na vlastnosti nástrojových ocelí**
Effect of sub-zero treatment on properties of tool steels
P. Jurči, Slovak University of Technology in Trnava, Slovakia

11:00 **Odolnost proti opotřebení nástrojové oceli D2 pro práci za studena po plynové nitridaci kombinované s kryogenním zpracováním**
SMA
Wear resistance of D2 cold work tool steel after gas nitriding combined with deep cryogenic treatment
D. Hradil, COMTES FHT a.s., Czech Republic

11:20 **Tepelné zpracování vícenásobně reverzně kovaného nástroje**
Heat treatment of tool forged by repeated alternate upsetting and drawing out
A. Kříž, University of West Bohemia, Czech Republic

11:40 – 13:00 Oběd / *Lunch*
Restaurace / *Restaurant*

Vakuové tepelné zpracování
Vacuum heat treatment

Chairpersons: **Jiří Stanislav** – JST Consultancy
Filip Vráblík – ECOSOND s.r.o.

13:00 **Nízkotlaká cementace a žíhání v leteckém průmyslu**
Low pressure carburizing and annealing in aircraft industry
N. Beck, ALD Vacuum Technologies GmbH, Germany

13:20 **Procesní média ve vakuovém tepelném zpracování. Kapalné kalicí prostředky a ochranné nátěry – vlastnosti a aplikace**
Process media in vacuum heat treatment. Liquid quenchants and stop-off paints - properties and application
F. Vráblík, ECOSOND s.r.o., Czech Republic

13:40 **NADCA 207-2016 jako návod pro systém řízení jakosti tepelného zpracování ocelí pro práci za tepla**
NADCA 207-2016 AS quality manual for heat treatment of hot works steels
J. Stanislav, JST Consultancy, Czech Republic

14:00 **Zkušenosti s uplatněním normy NADCA v zakázkové kalírně**
Experiences with the application of the NADCA standard in the hardening shop
K. Tesárková, Bodycote HT, s.r.o., Czech Republic

14:20 – 14:40 Coffee Break

Povrchové technologie (PVD…)
Surface technologies (PVD…)

Chairpersons: **Šuchmann Pavel** – COMTES FHT a.s.
Václav Hošek – ECOSOND s.r.o.

14:40 **Plasmová nitridace a vliv materiálu**
Plasma nitriding and influence of materials
R. Gorný, Rübig SK, k.s., Slovakia

15:00 **Návrh plazmové nitridace nástrojových ocelí pro optimální nosnost a přilnavost tvrdých povlaků**
Plasma nitride layer design of tool steels for optimized load-bearing capacity and adherence of hard coatings
A. Dalke, TU Bergakademie Freiberg, Germany

15:20 **Zlepšení odolnosti proti opotřebení u austenitické oceli za použití kombinovaného zpracování elektronovým paprskem a následnou plasmovou karbonitridací**
Improvement of wear resistance of austenitic steel by combined treatment using electron beam cladding and subsequent plasma nitrocarburizing
E. Hegelmann, TU Bergakademie Freiberg, Germany

15:40 **Ověření možnosti průniku dusíku do oceli pomocí N-kalení**
Verification on possibility of nitrogen infiltration into steel by N-Quench
SMA A. Nakamura, Toyota Technological Institute, Japan

16:00 – 16:20 Coffee Break

Zařízení pro tepelné zpracování
Equipment for vacuum heat treatment

16:20 **Přehled vakuových pecí pro procesy tepelného zpracování**
Overview of vacuum furnaces for heat treatment processes
A. Dappa, IVA Schmetz GmbH, Germany

16:40 **Údržba vakuových pecí a grafitových komor**
Service of vacuum furnaces and graphite chambers
SMA V. Hošek, Kompozitum / ECOSOND s.r.o., Czech Republic

17:00 **Modernizace řízení starších vakuových pecí pomocí PC a programu Control Web**
Modernization of control system of old vacuum furnaces using PC and control web
Z. Kolář, Manobike Zdeněk Kolář, Czech Republic

17:20 **Žáruvzdorné kovy v konstrukci pecí a strojírenství**
Refractory metals in furnace construction and engineering
V. Průša, Plansee, Czech Republic

17:40 **Konec sekcí / END of the first day**

19:00 **Gala Dinner**

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23:00 **End**

STŘEDA / *WEDNESDAY* 21. 11. 2018

HLAVNÍ KONFERENČNÍ SÁL / *MAIN CONFERENCE HALL*

Chairpersons: **Jiří Hájek** – University of West Bohemia
Luboš Procházka – ECOSOND s.r.o.

Vakuové tepelné zpracování neželezných kovů a slitin
Vacuum heat treatment of non ferrous metals and alloys

9:00 **Vývoj technologie svařovaní pomocí elektronového paprsku pro výrobu aditiv AlSi10Mg**
SMA *Development of an electron beam (EB) welding technique for additive manufactured (AM) AlSi10Mg*
P. Hollmann, TU Bergakademie Freiberg, Germany

9:20 **Vliv morfologie grafitu na nitridaci a na opotřebení stabilní litiny ve srovnání s metastabilní zpevněnou povrchovou vrstvou z litiny**
Influence of graphite morphology on the nitriding and wear behaviour of stable solidified cast iron compared to metastable solidified surface layer of cast iron
N. Klose, TU Bergakademie Freiberg, Germany

Souvislosti mezi strukturou a vlastnostmi, metalografie, řešení výrobních problémů
Relationship between structure and properties, metallography, solution of industrial problems

9:40 **Porovnání laboratorních a provozních zkoušek odolnosti proti opotřebení pro vybrané nástrojové oceli pro práci za studena**
SMA *Study of differences between results from laboratory tests and tests of real tools for selected cold work tool steels*
M. Kuřík, ČVUT Praha, Czech Republic

10:00 **Možnosti úplné automatizace přípravy metalografických vzorků a měření tvrdosti v provozech tepelného zpracování**
Possibilities of complete automation in metallographic sample preparation and hardness testing in thermal processing operations
D. Černický, Metalco Testing s.r.o., Czech Republic

10:20 **Metalografická príprava vzoriek pred meraním tvrdosti**
Metallographic samples preparation before hardness testing
P. Halász, STRUERS GmbH, Czech Republic

10:40 – 11:00 Coffee Break

Chairpersons: **Antonín Kříž** – University of West Bohemia
Luboš Procházka – ECOSOND s.r.o.

11:00 **Kontrola tepelného zpracování pomocí měření tvrdosti**
Inspection heat treatment by hardness testing
M. Josífek, STRUERS GmbH, Czech Republic

11:20 **Automatický systém měření tvrdosti AMH55**
Automatic hardness testing system AMH55
J. Kuna, Leco Instrumente spol. s r.o., Czech Republic

11:40 **Měření hloubky tepelně zpracované vrstvy**
Case depth measurement and analysis
R. Zapletal, TSI System s.r.o., Czech Republic

12:00 **Vliv volby parametrů při indukčním kalení na deformaci a vlastnosti výrobků z nástrojových ocelí**
Parameters which affect distortion and properties in induction heat treating process of tool steels
J. Hájek, University of West Bohemia, Czech Republic

12:20 **Čištění dílců před tepelným zpracováním ve vakuu**
Cleaning of parts prior to heat treatment process in vacuum
R. Konvalinka, SurTec ČR s.r.o., Czech Republic

12:40 **Announcement of the Best Presentation Paper winner, sponsored by ECOSOND s.r.o.**

SMA

VTZ 2018
THE BEST PAPER

12:50 **Announcement of the National Conference on Heat Treatment 2019**

12:55 **Closing Ceremony**

13:00 **End of the Conference**

13:00 Lunch
Restaurace / *Restaurant*

POSTER SESSION

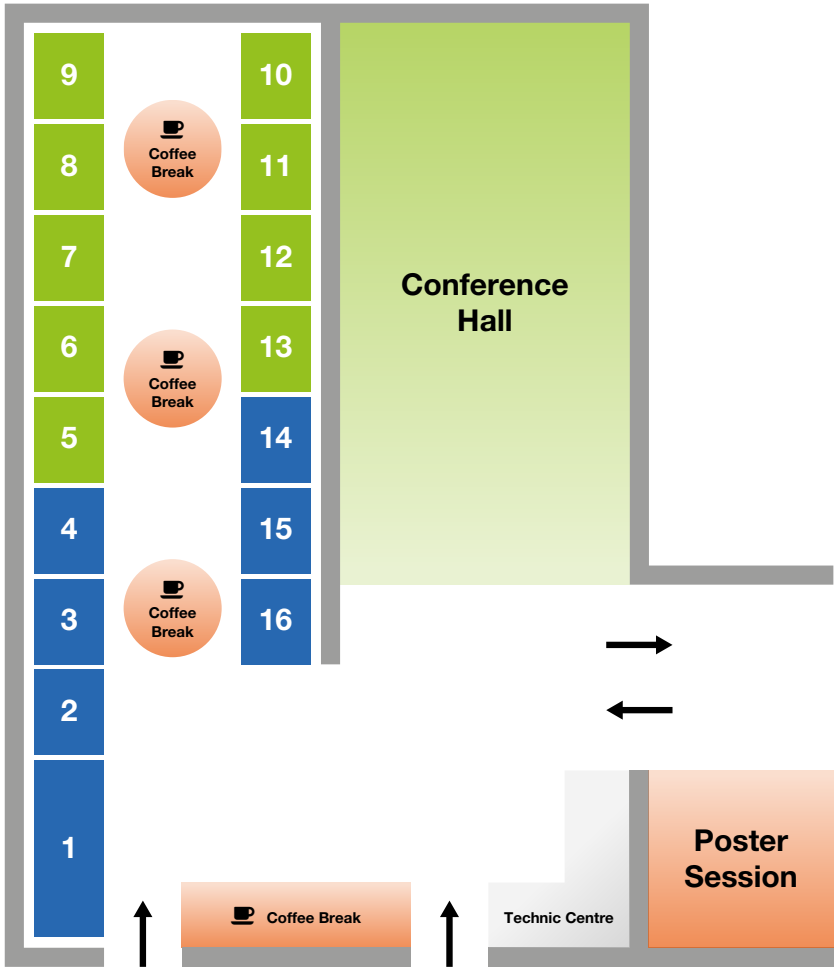
Vliv provozní teploty na kulová ložiska
Influence of operating temperature on rolling bearings
E. Kantoríková, Žilinská univerzita v Žiline, Slovak Republic

Mikromechanizmus lomu kryogénne spracovanej nástrojovej ocele Vanadis 6
Fracture micromechanism of cryogenically processed Vanadis 6 tool steel
J. Ďurica, Slovak University of Technology in Trnava, Slovak Republic

Vplyv zmrazovania a popúšťania na mikroštruktúru a lomovú húževnatosť ledeburitickej nástrojovej ocele
Influence of sub-zero treatment and tempering on the microstructure and fracture toughness of ledeburitic tool steel
J. Ptačinová, Slovak University of Technology in Trnava, Slovak Republic

Vliv kryogenního zpracování na vlastnosti nitridační vrstvy
The effect of cryogenic treatment on the properties of the nitriding layer
J. Hájek, University of West Bohemia, Czech Republic

Vliv použitého kalícího média na popouštěcí křivku vybrané nástrojové oceli pro práci za studena
Effect of the used hardening medium on the tempering curve of the selected cold work tool steel
M. Kuřík, ČVUT Praha, Czech Republic



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Exhibition Catalogue

Stand 1

Tenova (SCHMETZ + B.M.I. + IVA)

www.schmetz.de

- Horizontal high temperature vacuum chamber furnaces
- Vertical high temperature vacuum furnaces
- Vertical high temperature vacuum pit type furnaces

www.bmi-fours.com

- High temperature vacuum furnaces
- Low pressure thermochemical treatment furnaces
- Low temperature vacuum furnaces

www.iva-online.com

InnoVA 4.0
Horizontal retort furnaces
Pit type furnaces
Sealed quench furnaces
Box-type furnaces
Rotary hearth furnaces

Stand 2

ECOSOND s.r.o.
www.ecosond.cz

ECOSOND (Ltd. company) was established in 1992 as a specialized company for the development, training, services, expertise and supplies in the field of heat treatment of steel.
We are partner of hardening shops and production plants with heat treatment and chemical heat treatment of metals.
Our company has many years of experience that we would like to share with you to keep your processes under control.

Stand 3

LECO Instrumente Plzeň, spol. s r.o.
www.cz.leco-europe.com

Since 1936, customers around the world have trusted LECO to provide analytical solutions for a variety of applications and markets. LECO is a leader in innovative analytical instrumentation, mass spectrometers, metallography and optical equipment, and consumables.

Stand 4

REALISTIC a.s.

www.realistic.cz

Today the company is an important worldwide manufacturer of high-end industrial electric and gas furnaces.
The portfolio of its products are devices for the technology:

- heat treatment and chemical heat treatment of metals
- firing porcelain and ceramics
- preheating before the forging and post processing
- melting of nonferrous metals
- drying or special warmings.

Stand 5

Metalco Testing s.r.o.

www.metalco.cz

Company Metalco Testing s.r.o. is a direct representation on the Czech and Slovak markets of major European manufacturers of scientific equipment: ATM - metallographic instruments, ELTRA - chemical analysis instruments, Qness – hardness testing, EXAKT - producer of precision band saws and grinders, Carbolite Gero – laboratory and infustrial furnaces up to 3000°C, dhs – solutions for image analysis.
With 15 years of experience in field of material testing and thanks to these brands, the company Metalco Testing guarantees to their customers the highest quality of application support, reliable testing solutions, accuracy and reproducibility of results, quality and reliability of testing equipment with truth meaning of „Made in Germany“.

Stand 6

TSI System s.r.o.

www.tsisystem.cz

- Material testing technique
- Non-contact temperature measurement
- Industrial diagnostics
- Non-destructive testing

Stand 7

Activair s.r.o.

Company Activair delivers vacuum pumps and vacuum technologies and provides service, upgrades and repairs. It has its own designers, developers and PLC specialists. On the Czech and Slovak markets, he also represents Edwards - a leading manufacturer of vacuum technologies with more then 100 years old history.

Stand 8

Linde Gas a.s.

www.linde-gas.cz

The Linde Gas a.s. company is the biggest producer and distributor of industrial, medicinal, and specialty gases in the Czech republic. In the area of the chemical and heat metal treatment, our company offers comprehensive solutions of industrial gas applications that contribute to the production effectiveness and quality enhancement. It mainly concerns the protective and reaction gases that we supply. We offer different methods and supply systems that secure more effective and safer application than the protective and reaction gas production in the generators. We offer our customers smart solutions by utilisation of nitrogen, methanol, and hydrogen - CARBOFLEX® and HYDROFLEX®. Our applications engineers are ready to help you by the gas and equipment selection that is the most suitable just for your specific application.

Stand 9

Galtex spol. s r.o

www.galtex.sk

Company Galtex since year 1993 performs and secures:

- service and repair of the heat treatment devices
- reconstruction, renovation and modernization of heat treatment devices
- repair and replacement od furnace lining
- relocation of entire hardening rooms

Galtex l.t.d. is an exclusive distributor of Noxmat (burners producer) for Czech and Slovak Republic

Stand 10

Rübig SK, k.s.

www.rubig.com

Latest technology in heat treatment with shortest possible processing time! At our subsidiary we provide you with a wide range of services when it comes to steel as a material:

- Case hardening
- Gas nitriding
- Hardcoating
- Plasma nitriding
- Vacuum hardening

Stand 11

voestalpine High Performance Metals CZ s.r.o.

www.voestalpine.com/highperformancemetals/czech-republic

Our subsidiary High Performance Metals CZ s.r.o. based in the Czech Republic focuses on technologically demanding product segments and has a leading position in the market for special and tool steel, forgings and customer-specific services including heat treatment, coating and additive manufacturing processes. Our division has worldwide leading brands Böhler and Uddeholm with a long-standing tradition in high-performance materials. Our coordination with design engineers, toolmakers, as well as tool users, allows us to present our customers with complete solutions. The most important customer segments are the automotive, oil and natural gas exploration, and mechanical engineering industries as well as the consumer goods and aerospace industries. voestalpine High Performance Metals CZ s.r.o. is also represented by voestalpine Böhler Welding, a manufacturer of welding, welding and soldering materials.

Stand 12

ROTANEO s.r.o. + KOMPOZITUM s.r.o.

www.rotaneo.sk

The company is a general supplier of spare parts for vacuum furnace hot zones. Our portfolio includes graphite elements, graphite insulations, CFC elements, variety of molybdenum and ceramic parts. Besides serving the customers in heat treatment industry - our comprehensive production program in ROTANEO includes also production of technical ceramics, special silicon-carbide products
and spare parts for production of mechanical seals.

www.kompozitum.sk

KOMPOZITUM s.r.o. is a leading manufacturer of carbon and graphite products including their impregnations by various mediums like resins and molten metals. By manufacturing graphite parts - KOMPOZITUM focuses on all segments of heat-treatment industry.

Stand 13

Ing. Ludmila Ludwigová

Our company was founded in 2004. The company‘s core business is the installation and repair of vacuum furnaces. During our existence, we have achieved thereputation of a reliable partner in the area of heattreatment with scope throughout the Czech Republic.

Stand 14

Struers GmbH

www.struers.com

Struers is the world‘s leading manufacturer of equipment and consumables for materialographic surface preparation of solid materials. The wide product range including hardness testers and specialized equipment for picture analysis covers the customer’s specific needs. With affiliates in 24 countries, representatives in more than 50 countries and a global application specialist team, Struers provide a global support and service.

Stand 15

Cronite CZ

www.safe-industry.com/en/safe-cronite/cronite-cz-brno

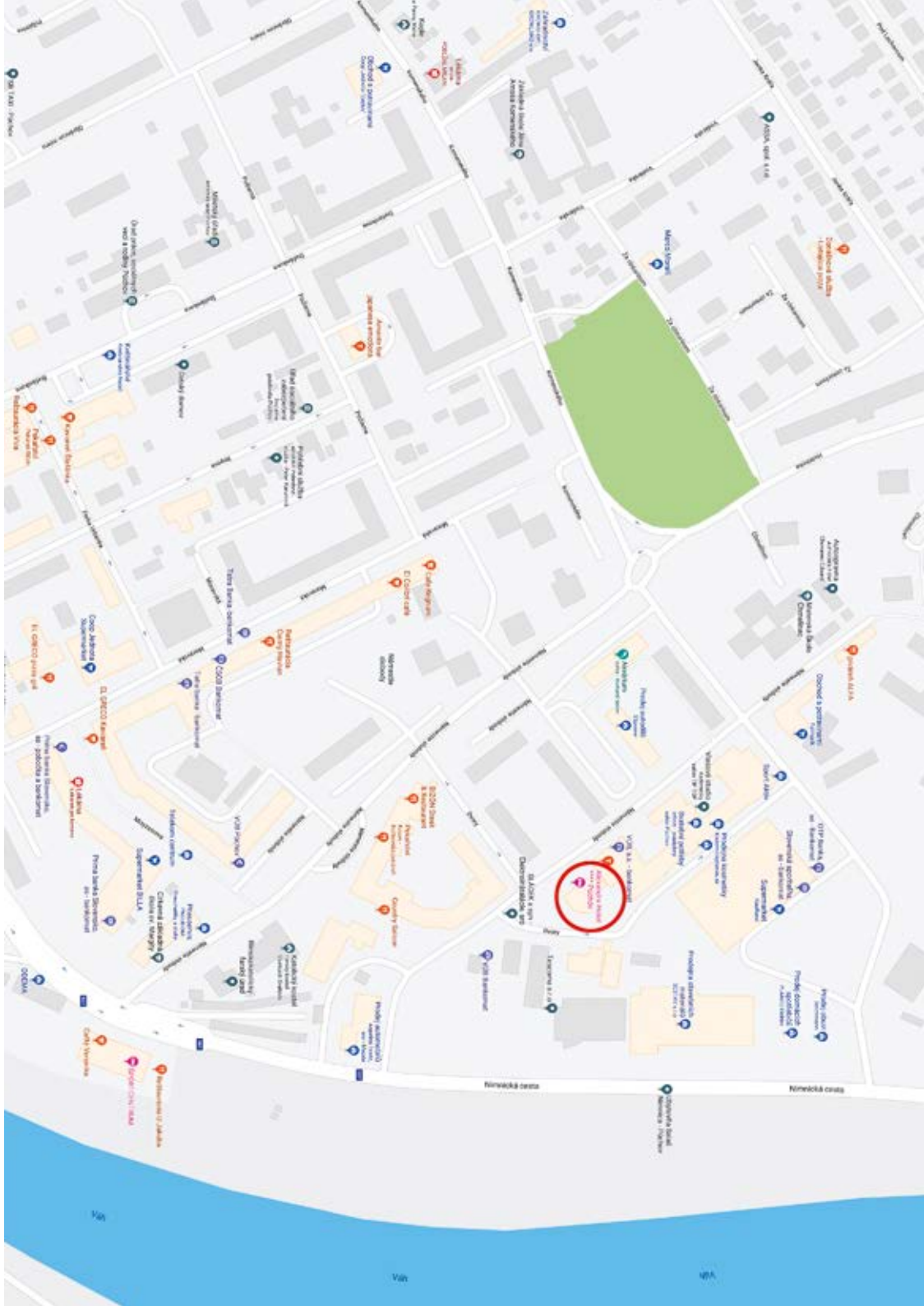
Safe Cronite is leader in heat treatment assembly jigs (base trays, baskets etc.)for all types of the furnaces (chamber type, pusher, pit, LPC, vacuum etc.) and incineration hearth markets, and recognised around the world for its Cronite Castings (UK), AMR KLEFISCH (Germany) and Cronite Mancelle (France) trade names. We cumulate over 50 years of experience in designing and producing heatproof cast steel components that are resistant to high temperatures, abrasion, and corrosion.
We supply all important hardening shops including automotive industry as well as furnace makers. We keep at disposal large palette of standard patterns, can also develop new design of fixtures for heat treatment to optimize the capacity at the customer.
We are also supplier of fabricated fixtures, radiant tubes and rollers for industrial furnaces.
Over 4% of turnover is reinvested in R&D. Modern design assistance methods enable achieving continuous improvements.

Stand 16

AIR PRODUCTS spol. s r.o.

www.airproducts.cz

Air Products (NYSE:APD) is a world-leading Industrial Gases company providing atmospheric and process gases and related equipment to manufacturing markets.



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