



Annual report 2010

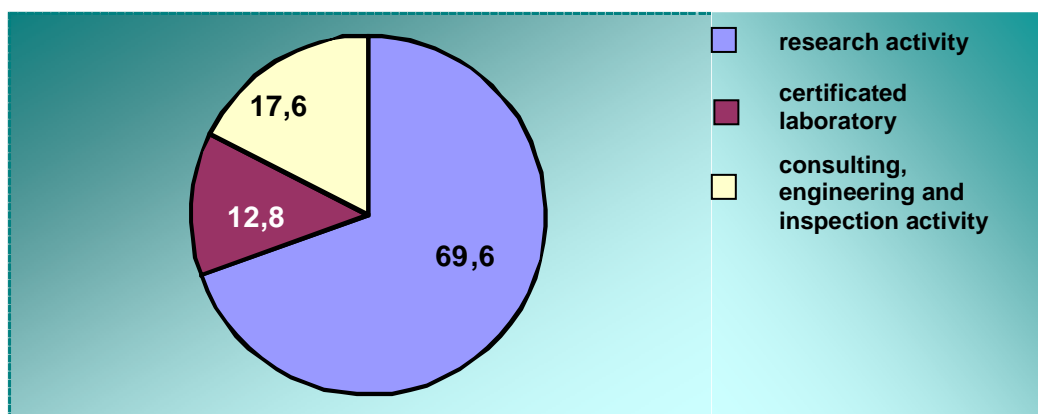
Activities of company

SVUOM Ltd., a private company pursues research, development, consulting, testing, expert accounts, inclusive environmental ones, and other activities according to the demands of its clients. SVUOM Ltd. was founded in 1999 and it continues in research, testing, consulting and inspection activities of State Research Institute of Protection of Materials (1952 -1994).

The SVUOM Ltd. creates and implements research results within the fields of materials, process, products and production technologies from point of view of degradation, corrosion and corrosion protection. The international collaboration takes place with other institutes, universities, academia or companies where the EU programmes dominate.

SVUOM revenues come from a number of different sources:

- ▶ commercial activities - R&D activity for industry, testing, laboratory assessment, expertising, inspection,....SVUOM Ltd. has many customers, a clear majority of them are small and medium-sized companies which cannot perform their own research resources.
- ▶ testing of climatic and corrosion resistance and physico-mechanical properties of materials and coatings in laboratory accredited according to EN ISO/IEC 17 025
- ▶ technical standardization – since 2009 SVUOM Ltd. had been licensed by the Czech Office for Standards, Metrology and Testing (ÚNMZ) as Centre for Technical Standardisation in the field of corrosion and corrosion protection,
- ▶ publication and lecturing,
- ▶ national projects – publicly financed long-term basic and applied research, primary initiated by the Ministry of Education, Ministry of industry, Czech Science Foundation, etc.,
- ▶ EU projects - R&D commissions for which financing is shared between the EU, industry and other research institutes.



Turnover per subsidiary - 2010

Projects and programmes

The national programmes represent around per cent of activities of SVUOM Ltd. There are major multi-year programmes initiated mainly by the Czech Science Foundation, Ministry of Education, Ministry of Industry, etc., which concerns long-term basic and applied research and provide contacts between institutes, universities and industry.

The information of projects can be found on e.g. www.atmofix.cz, www.bestproduct.cz or www.svuom.cz.

VZ MŠMT 2579478701 Study of methods for specification of prediction of service life of metallic materials and their protective coatings in respect to effect of pollute compounds for environment (2004 - 2010)

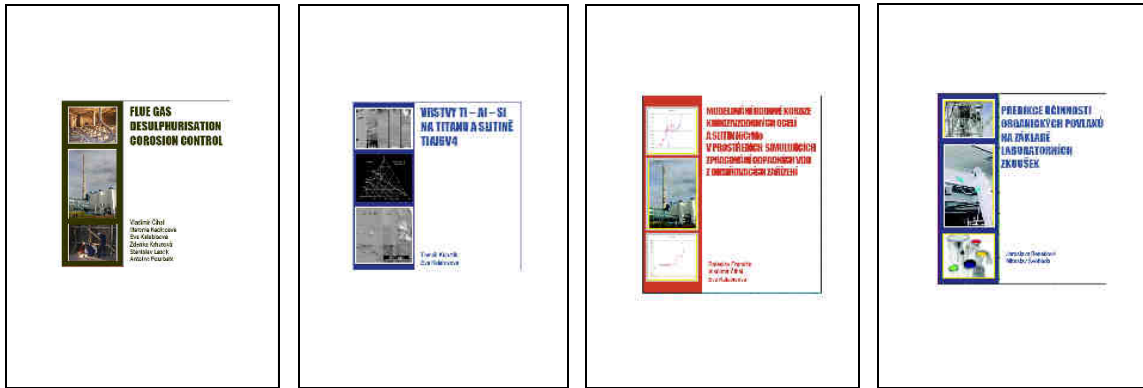
In 04/2010 the 2nd International Conference Corrosion and Material Protection had been held in Prague – EFC event No. 322. The program of conference contained 54 papers from ca 25 countries. Unfortunately, the timing of the conference coincided with the aftermath of the volcanic eruption in Iceland that has wreaked havoc in international air travel and brought European airports to a standstill. The conference agenda was appropriately modified.



The proceeding from conference with all papers is available.

Project resulted into 8 publications for different topics solved during project:

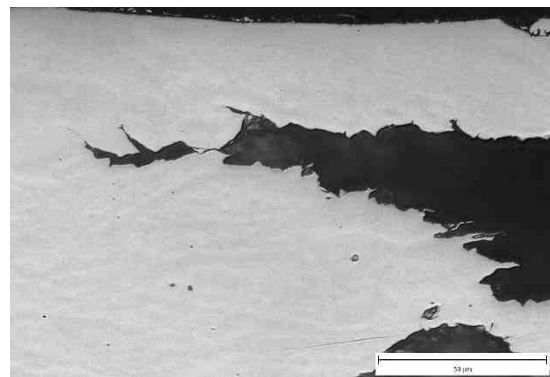
- Application of surface analysis for lifetime assessment,
- Atmospheric corrosivity and prediction of atmospheric corrosion,
- Coatings of Ti - Al - Si on the titanium and on the TiAl6V4 alloy,
- Corrosion behaviour of metals and metallic coatings in the atmospheric environments,
- Flue gas desulphurization corrosion control,
- Modelling of pitting corrosion of stainless steels and NiCrMo alloys in the environments simulating waste water treatment of flue gas desulphurisation plants
- Prediction of the effectiveness of organic coatings on the basis of laboratory tests,
- Verification of life hydrophobic impregnation of concrete in the exposure environment outside atmosphere



GA ČR 106/08/1789 Degradation mechanism of cold worked stainless steels in aggressive environments (2008-2010)

Increase of mechanical characteristics of austenitic stainless steels by cold deformation with possibility of application to high stress has a result in degradation by corrosion damage of those materials in more or less aggressive environments. Structural changes in dependence on degree of deformation with eventual martensitic transformation can induce susceptibility to initiation of local defects. In environments containing halide ions, sulphur compounds, etc., metallurgical effects can participate in increased susceptibility of those materials to pitting corrosion and stress corrosion cracking. Due to localisation of corrosion attack all those processes and the studies of their

mechanisms have a great significance for life and safety of high load bearing constructions, including steel ropes, implants, etc.



MPO FT-TA4/095 Changes of rubber lining quality and monitoring methods due to service-life (2007 - 2010)

In 2010 the laboratory tests had been finalised and the results were compared with results from real industrial tests. The basic measured parameters were abrasion resistance and hardness of tested rubbers.

The new method of measurement of deformation by tensometers had been developed together with software for this measurement.



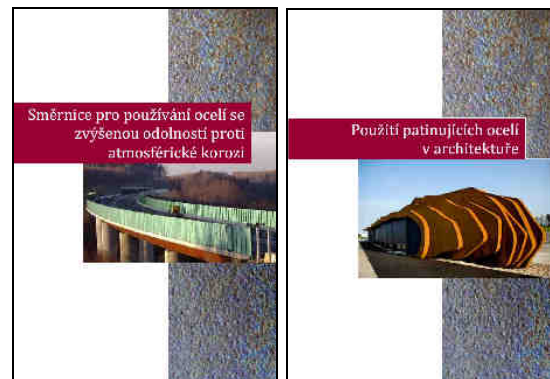
MPO FT-TA5/076 Study of existing and newly developed weathering steels in respect to their usage for steel structures (2008 - 2010)

The solving of project was orientated onto study of some new types of weathering steel by atmospheric and accelerated corrosion tests. The effect of chloride on corrosion behaviour had been deeply studied. The corrosivity of road environments was estimated for 3 localities in the Czech Republic. The samples were exposed in marine atmosphere in Spain as results of co-operation with CENIM, Madrid.

The results of project were presented on seminary held on 23-11-2010 at VŠB – TU Ostrava. The presentations from this seminary are available on www.atmofix.cz. There were more than 40 participants on this seminary.



Publications were prepared with the project's results oriented onto steel constructions, mainly bridges, and architecture's applications.

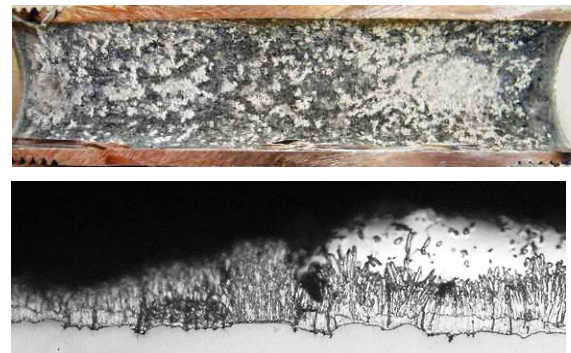


MPO FR-TI1/560 Optimisation of production and operating conditions for galvanized tubes used for indoor water distribution system (2009 - 2011)

After ca 2 years of solving of project some basic factors affecting the service life of galvanized tubes for hot water distribution had been found from the case studies of failed tubes from real distribution systems.

The effect of copper ions was studied because the combination of this material can be found in distribution systems. The character of pitting corrosion was studied and copper ion concentration in corrosion products was analysed. The basis for this study was the founding from real distribution systems where the metallic materials are mixed.

The model and operation tests continue with different type of galvanized coatings prepared by producers. The uniform thickness of η phase – has a significant effect onto corrosion resistance.



MPO FR-TI1/274 Evaluation of SHM methods and its integration into aircraft maintenance system (2009-2012)

The aim of the project is R&D of a new technology for monitoring of airframe structure critical parts degradation due to material fatigue and corrosion development. Sensors permanently attached to critical airframe parts will be used. First, critical airframe parts, type of fatigue cracks and corrosion relevant for selected parts will be defined, and sensors and methods for their monitoring will be identified. In the second phase, fatigue and corrosion laboratory tests on test specimens will be executed. Objective of the tests is benchmark of used sensors, and signal database collection for following project tasks.

The tasks will deal with development of an analytics for the monitored structure degradation prediction under given operational conditions. The system will allow integration into high level information

and control system with connection to logistics and maintenance planning. Finally, the project results will be demonstrated on aircraft part in laboratory with regard to the project time available.



Galvanic Corrosion on the MB-339 Attach Fitting



The international programmes, primarily within the European collaborative venture, give SVUOM specialists the opportunity to share the latest progress in the field of corrosion and corrosion protection research – new materials, technologies, methods of evaluation, etc. This also applies to international standardisation contexts where SVUOM is an active participant.

UN/ECE ICP on Effect on Materials Including Historic and Cultural Monuments (since 1987)

SVUOM participates as sub centre for structural metals and corrosivity trends. The work of the sub centre represents the periodical evaluation of the corrosion effects, statistical analyses for corrosion effects and environmental variables, trend analyses, quantitative evaluation of the effect of pollutants on the atmospheric corrosion of structural metals.

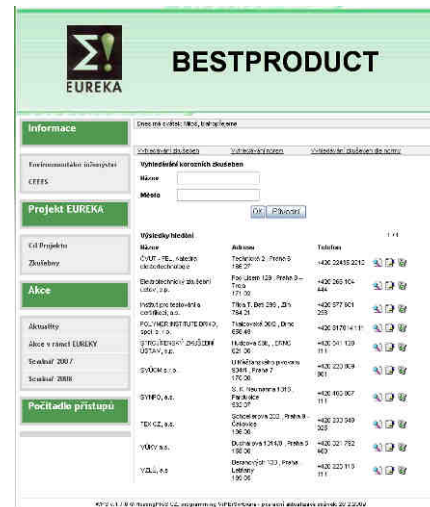
In 2010 the trends in changes of air pollution, atmospheric corrosivity and the effect on materials had been estimated.



BESTPRODUCT - TENEEEST Through a European Network on Environmental Engineering Sciences and Technologies (Σ! 3517 Eureka) (2007 - 2010)

The project resulted into some publications and database of certificated laboratories performed climatic and corrosion tests – this database serves for industrial partners for their better information of these services. The database includes also European laboratories because some tests are so special that they are not performed in the Czech Republic.

The comparison of different cyclic accelerated tests with the period of salt spray had been performed together with comparison of basic structural metals' corrosion loss from road environments.



Centrum of technical standardisation

SVUOM represents the Centrum of technical standardisation for the field of corrosion and corrosion protection. This Centrum is responsible for international co-operation in standardisation in this field as well as co-operate on national level with many specialists for technical praxes.

In year 2010 25 new or revised standards for corrosion and corrosion protection had been published. Since 2010 SVUOM brought information about the new or revised technical standards for the corrosion and corrosion protection in journal *Corrosion and material protection* (KOM, www.casopis-koroze.cz).



Collaboration with colleges, universities and other bodies

A wide range of contacts has been built up since many projects involve collaboration with the academic world as well as industry. SVUOM Ltd., and/or its employees personally, take part in national and international networks with colleges, universities, institutes, companies, and other bodies in various fields of activity.

SVUOM's specialists co-operate with universities (e.g. VSCHT Prague, CVUT Prague, VŠB-TU Ostrava, TU Bratislava, VŠ Košice) in frame of research projects and as lectors in various type of postgraduate and special courses (ERASMUS projects). Some students of technical universities elaborated their diploma studies and papers under supervision by SVUOM's specialists.

SVUOM and its specialists are members of European Federation of Corrosion (EFC), NACE International (National Association of Corrosion Engineers), Association of Corrosion Engineers (AKI) Association of Museums' Specialists (AMG). In the field of corrosion problems and corrosion protection SVUOM's specialists co-operated with many associations (Czech Association for Galvanizing, Czech Society for Surface Treatments, Czech Association of Scientific and Technical Societies).

The co-operation in the field of atmospheric corrosion, mainly the exposure of samples on Czech atmospheric test sites, continues with Institution of Corrosion, Brest, France.

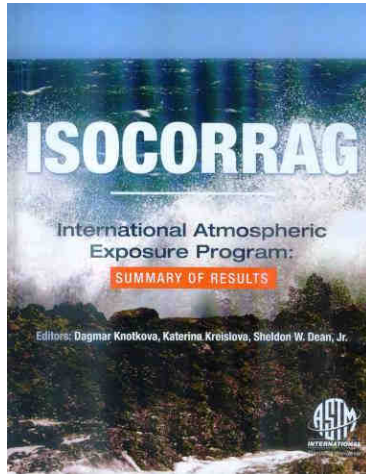
Publications

In 2010 SVUOM's specialists presented results of their research on many national and international conferences and in national and international journals, e.g.:

- T. Kubatík, M. Šulc, E. Kalabisová, V. Číhal, Structure and properties of silicido-aluminide layers prepared by Liquid siliconizing method, 2th International Corrosion and Corrosion protection (EFC), Conference Czech republic, April 19 to 22, 2010
- T. Kubatík, E. Kalabisová, V. Číhal, Structure and high temperature stability of layers prepared by Liquid siliconizing method from Al-Si melt on TiAl6V4, 2th International Corrosion and Corrosion protection (EFC), Conference Czech republic, April 19 to 22, 2010
- T. Kubatík, M. Jáglová, E. Kalabisová, V. Číhal, Liquid-Phase siliconizing method for prepare silicido-aluminide protective layers resistant to high temperature oxidation, EUROCORR'2010, Moscow, Russia, 13th -17th September, 2010
- T. Kubatík, M. Jáglová, E. Kalabisová, V. Číhal, Improvement of oxidation resistance of TiAl6V4 alloy by siliconizing from liquid phase using melts with high silicon content, *Journal of Alloys and Compounds*, (2010), IN PRESS
- T. Kubatík, E. Kalabisová, V. Číhal, Preparation and evaluation of layers produced by the liquid phase silicon coating technique, *Oxidation of Metals*, (2010), IN PRESS
- K. Kreislova, D. Knotkova, T. Kubatík, J. Had, P. Sajdl, Properties and protective ability of long-term exposed weathering steel constructions in the Czech Republic, proceeding of EUROCORR 2010, 13-17.9.2010, Moskow
- D. Knotkova, K. Kreislova, W.S. Dean, J. Tidblad, Atmospheric corrosivity classification and long-term exposure programmes, proceedings of 2nd International conference Corrosion and Material Protection, ISBN 978-80-903933-6-3, 19-22 April 2010, Prague
- A. Koukalova, K. Kreislova, P. Strzyz, The evaluation of corrosion damage of galvanized tubes for hot water distribution, proceedings of 2nd International conference Corrosion and Material Protection, ISBN 978-80-903933-6-3, 19-22 April 2010, Prague

SVUOM specialists presented the results of their on many national conferences and on many journals, e.g. Konstrukce, Silnice a železnice, Koroze a ochrana materiálu, etc.

In 2010 the book *ISOCORRAG International Atmospheric Exposure Program: Summary of results* was edited by D. Knotkova, K. Kreislova, S.W. Dean, Jr., ASTM Data Series 71, Stock No.: DS71, ISBN 978-0-8031-7011-7.



Metals, protective coatings and other materials deteriorate when exposed to atmospheric environments. The ISOCORRAG program was designed to find simple dose-response relationships between the environmental parameters and the corrosion damage.

This book presents the results of the ISOCORRAG program in a single document so that engineers, scientists, students and other interested parties may have access to them. In addition, an extensive list of references has been included to assist the reader in locating these analyses of the data contained in this book.

In 2010 SVUOM Ltd. published special guideline for industrial praxes except the publications mentioned above:

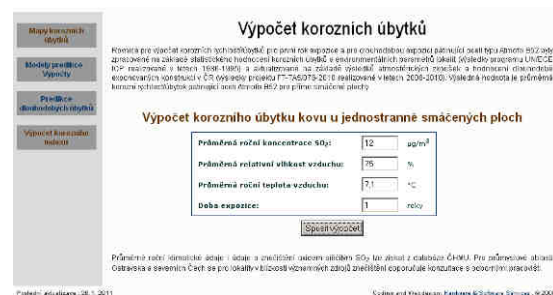
- Corrosion map of ČR for copper - special map (ISBN 978-80-903933-4-9),
- Specific properties of alloy zinc coatings – Comments to ISO 15726 Metallic and other inorganic coatings – Electrodeposited zinc alloys with nickel, cobalt or iron.



Licences

In 2010 the SVUOM's results of R&D project had been registered:

- software for prediction of corrosion arte of weathering steel for steel construction,
- software for tensometric measurement of rubber deformation.



Structure of company

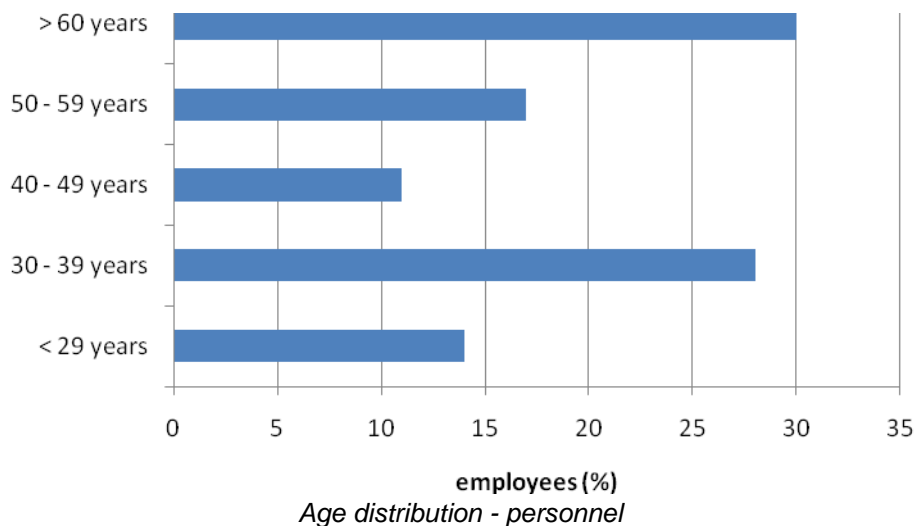
The commercial and research activities are solved in special divisions of company:

- division of atmospheric corrosion,
- division of corrosion engineering,
- division of organic coating,
- division of inspection,
- certificated laboratories.



Employees and competence

The most important asset of a knowledge-based institute like SVÚOM is its intellectual capital. In 2010 the SVÚOM had a total of 31 employees from which 24 have university degree including 1 professor and 4 doctors. There is even distribution of the sexes (53 % of employees are women).



SVUOM's specialists are members of international and national TC of standardization organizations (ISO, CEN) and active participate on elaboration of technical standards in the field of corrosion and corrosion protection specification and testing.

SVUOM's specialists are certificated as corrosion engineers and corrosion technologists according to Std- 401 APC.

SVUOM specialists are nominated by Ministry of Industry and Ministry of Environment as members of EU TWG for preparation BREF documents in categories 2.6 *Installations for the surface treatment of metals and plastics using an electrolytic or chemical process where the volume of the treatment vats exceeds 30 m³* and 6.7 *Installations for the surface treatment of substances, objects or products using organic solvents with a consumption capacity of more than 150 kg per hour or more than 200 tonnes per year.*

Economy

Survey of economy (in thousands of CZK)

Balance sheet	2007	2008	2009	2010
financial assets	16 857	16 790	16 826	14 004
tangible fixed assets	7 355	6 787	6 174	5 652
debtors due within one year	2 167	3 083	2 328	2 902
cash at bank	7 282	6 887	8 254	4 687
subscribed capital	9 044	400	0	0
revenue from R&D per research worker	741	835	668	451

During whole year 2010 the downturn of Czech economy affected SVUOM's customers and the number of testing and inspection cases from industry decreased. It had a significant effect on SVUOM profit.

Long-term economy tendency

Thousand CZK

The SVUOM Ltd. does not distribute its profits, i.e. the financial results arising from the company business shall be re-invested in the company concerned. In 2010 the some new instruments and equipments had been purchased to improve the quality of corrosion and protective coatings measurement, e.g. boroscope and digital microscope, etc.