

Annual report 2012

Basic data on company

Trade name:	SVÚOM Ltd.
Registered office:	U Měšťanského pivovaru 934/4 170 00 Praha 7
Company registration number/Tax identification number:	25794787/CZ25794787
Data of foundation:	1999
Legal form:	limited liability company

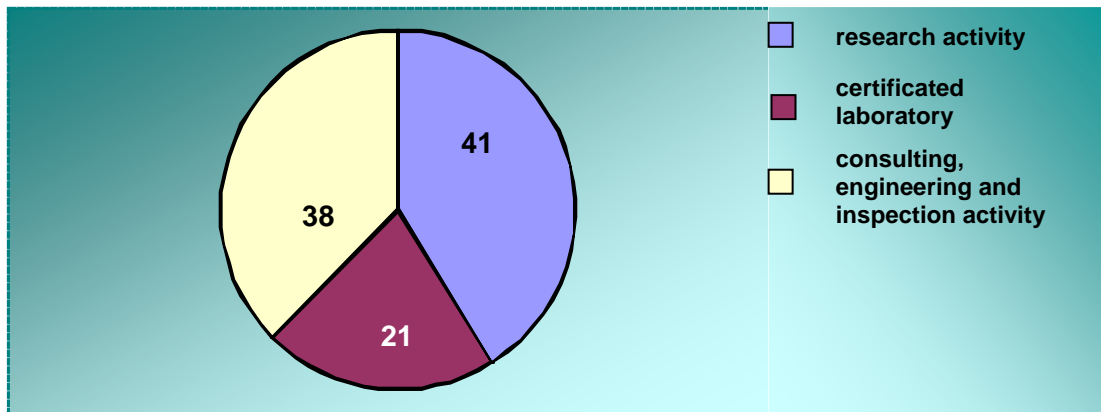
Company profile

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. Company's activities are focused on the customers' needs and requirements too.

SVUOM revenues come from a number of different sources:

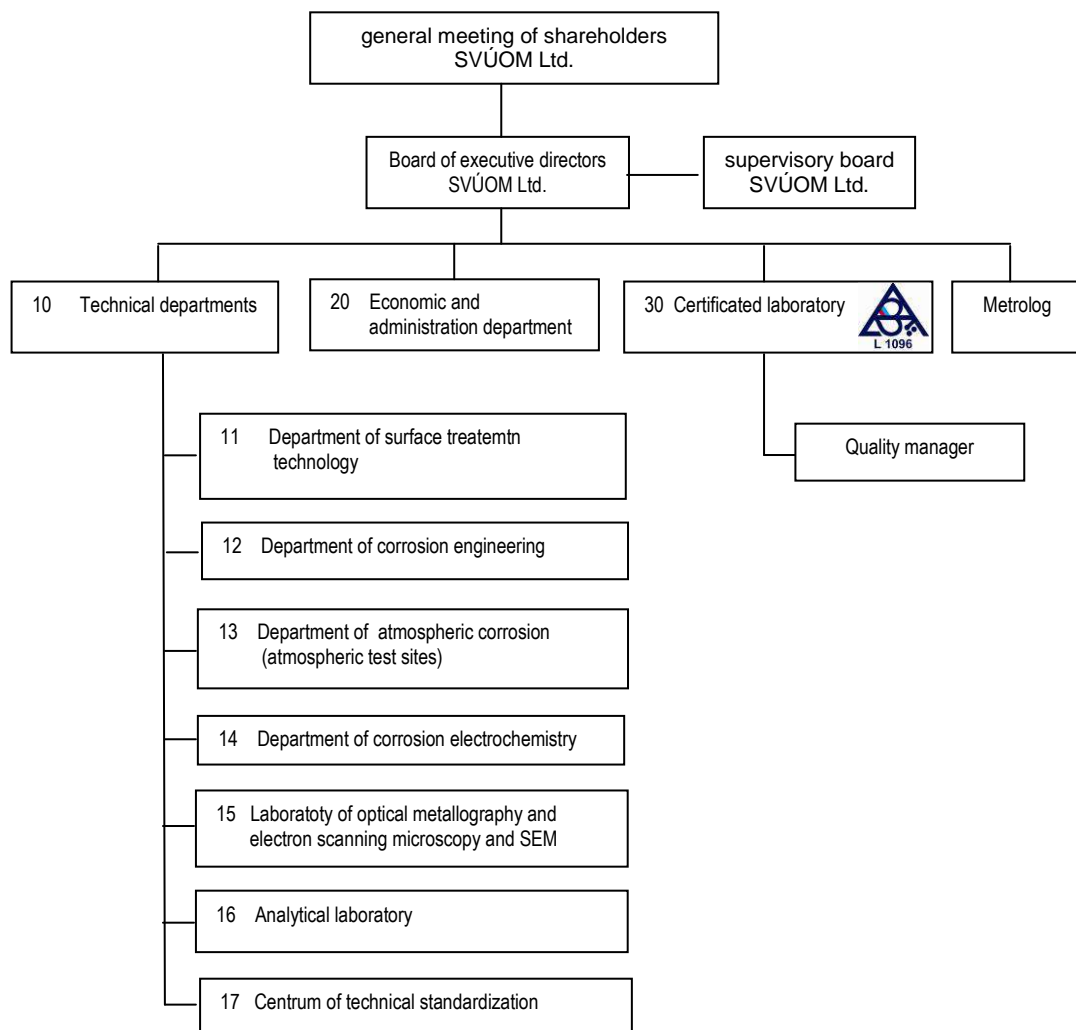
- ▶ commercial activities - R&D activity for industry, testing, laboratory assessment, expertising, inspection,.... SVÚOM Ltd. has many customers, a clear majority of them are small and medium-sized companies which cannot perform their own research resources.
- ▶ testing of climatic and corrosion resistance and physico-mechanical properties of materials and coatings in laboratory accredited according to EN ISO/IEC 17 025
- ▶ co-operation in the field of cultural heritage protection – metallic objects (corrosivity of microclimate of cultural objects, exhibitions, depositories; corrosion protection of decorative rails, evaluation, patination nad conservation of copper and bronze roofs, stauaes, etc.)
- ▶ 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,
- ▶ R&D national projects – publicly financed long-term basic and applied research, primary initiated by the Ministry of Education, Ministry of industry, Czech Science Foundantion, Technological Agency of Czech republic, etc.,
- ▶ EU projects - R&D commissions for which financing is shared between the EU, industry and other research institutes.



Turnover per subsidiary - 2012

Organization Chart of SVUOM Ltd.

In 2011 the Department of Corrosion engineering had moved from locality of Prague 6 and new department was started to build in locality of Horoměřice, Central Bohemia. Together with this movement the organization chart was changed.



SVUOM's laboratories and equipments



Highlights of 2012

- instalation special lighting for evaluation of painted samples according new technical standard EN ISO 13076 *Paints and varnishes - Lighting and procedure for visual assessments of coatings* together with calibrated in SVUOM's Certificated laboratory. Standard specifies the lighting and procedure for the visual assessment of degraded areas, spots or other defects on or in coatings after exposure to ageing or weathering influences.

Company references in 2012

From the total number of work performed by the company for industrial bodies in 2012, the biggest or the most interesting projects were, e.g.:

- Metrostav a.s. – inspection of corrosion protection system of Troja bridge, Prague,
- ČEPS, a.s. – evaluation of conductors during long-term atmospheric exposure,
- KONSTRUKTIVA a.s. – evaluation of copper sheets, reconstruction of Belveder palace roof, Prague,
- Povodí Vltavy – evaluation of surface treatment and coating yuality on weir flaps/shutters



Projects and programmes

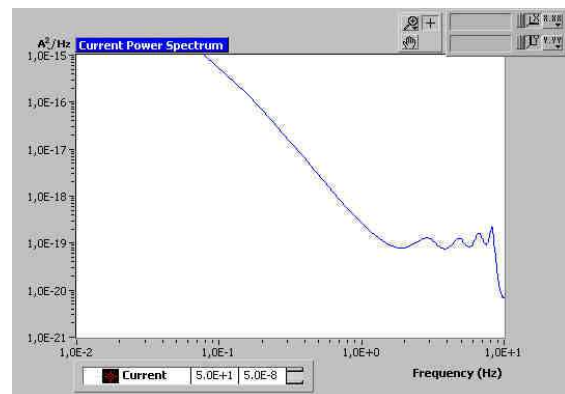
The national programmes represent around per cent of activities of SVUOM Ltd. There are major multi-year programmes initiated mainly by the Czech Science Foundation, Ministry of Education, Ministry of Industry, etc., which concerns long-term basic and applied research and provide contacts between institutes,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

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

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

AlCu4Mg1 (AA-2024) is attractive material finding application in aircraft structures. Unfortunately this alloy belongs to the category of heat treatable aluminium alloys including Al-Zn-Mg-Cu (7XXX series), Al-Cu-Mg (2XXX series) and Al-Mg alloys. In all these materials exfoliation is most common type of structural degradation caused by corrosive environment. This type of attack is strongly dependent on morphological parameters of the microstructure and on the chemistry of grain boundaries.

Ten measurements were performed on extruded stringer type specimens of AA-2024 during uninterrupted immersion test in EXCO solution with duration of 240 h. Statistical analysis of current noise data as well as power spectrum estimations by MEM methods was used to study these current signals.



Current power spectrum (MEM curve) for AA-2024 after 51 h of exposure in EXCO solution

The results obtained have enabled the averaged values of repassivation time of events relating to IG process (affected by internal stress arising from formation of corrosion products) to be correlated with the mechanism of corrosion predominant in the different periods of exposure.

TA ČR 01031043 Quantification of specific pollution effect on materials and corrosion protection in tunnels (2011 - 2014)

The aim of project is identification and quantification of principal degradation factors in tunnel environment, determination of degradation rate of basic material and surface treatment types, proposal and verification of suitable test methods and such systems, which would have required service life in tunnels. Estimation the air pollution effects on materials is basis for subsequent statistic evaluation which can be used in various fields and on different levels for technical, technological, economical and other decisions.

The corrosion damage of materials was evaluated at the tunnels Lochkov, Mrazovka, Letna and Klimkovice together with deposits analysis. The most sensitive materials are stainless steel and aluminium.

The measurement of climatic values, air pollutions and surface deposits had been performed together with samples metals representing the most exposed materials found for tunnel infrastructure and sensors exposure in Mrazovka tunnel.



Rack with samples and sensors exposed at Mrazovka tunnel



Active sampling of air pollution

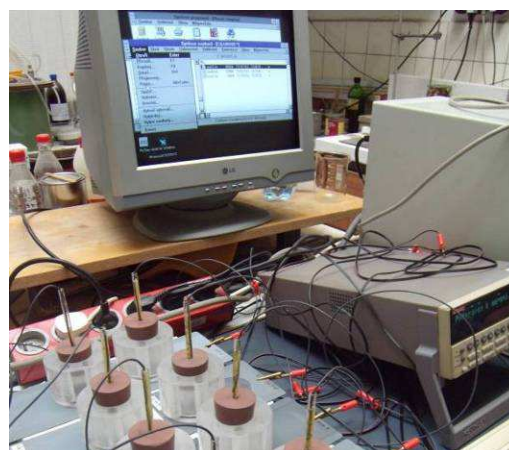
The corrosion attack was visually evaluated in monthly intervals and corrosion mass loss will be estimated after 1 year exposure.

TA ČR 01010183 - Effective anticorrosive and special coatings with lower content of zinc for protection of constructional materials (2011 - 2014)

The aim of the project is new formulations of anticorrosive and special coatings with high barrier protection, with significantly lower content of classical zinc powder, containing zinc nanoparticles, nanoparticles of metal oxides, carbon nanotubes, metallic and nonmetallic conductive pigments and fillers. Another goal is a proven technology for the production of new anticorrosive and special coatings with significantly lower concentrations of zinc. Anticorrosive and special coatings will be gradually introduced into the market while respecting the requirements of newly introduced legislative norms in the field of ecology and environment.

The primers were formulated with various pigment volume concentrations and the ratio between zinc dust and fillers was changed.

The anticorrosive effect of primers was determined after exposure in salt spray chamber. The micaceous iron oxide influenced positively the adhesion of coatings. Electrochemical and microscopic methods of verification of protective efficacy of newly formulated paints were also used.



TA ČR 01031314 - Optimisation of Safety and Reliability for Existing Bridges (2011 - 2013)

The aim of the project is development of methodology for assessment of safety and working life of bridges. In 2012 some

existing bridges were the evaluated as case studies.

Measurement of microclimate of steel bridge construction is performed on Slavičí údolí bridge, Prague City Ring together with regular evaluation of paint system and deposition of pollution on construction.



The critical surfaces are all areas affected by retain moisture and/or deicing salts

runoff. Deicing salts may cumulate on horizontal surfaces under the edge of bridge decks and under expansion dams. From field evaluation of many bridges it was estimated that the higher corrosion stress is ca in distance of 1.5 times of beam width from expansion dams.

The local form of corrosion rate is significantly higher than on flat, open surfaces – this phenomenon was verified on real bridge structures.

Type of corrosion		
uniform	pitting	crevice
0.01 – 0.5	0.4 – 8.0	0.3 – 12.0

The experimental investigation of corrosion losses of steel samples in different position on bridge structures is a part of project, too.



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 SVÚOM is an active participant.



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

SVUOM participates as subcentre for structural metals and corrosivity trends. In exposure period 2011-12 the pollution by gaseous nitric acid HNO_3 and newly by formic acid HCOOH and acetic acid CH_3COOH had been performed in 3 months' periods. NH_3 in area with intensive agriculture ca $7 \mu\text{g}\cdot\text{m}^{-3}$, in cities $0,05 \mu\text{g}\cdot\text{m}^{-3}$.

The yearly corrosion mass losses for standard structural metals were estimated in this period, too.

Exposed materials	Corrosion loss ($\text{g}\cdot\text{m}^{-2}$)	
	Prague	Kopisty
Carbon steel	66,88	221,90
Zinc	5,91	10,03
Copper	5,23	15,89



Test site	addition air gaseous pollutants ($\mu\text{g}\cdot\text{m}^{-3}$)			
	HCOOH	CH_3COOH	HCl	HF
Prague	0,878	0,300	0,174	0,029
Kopisty	1,025	0,425	0,088	0,028



EVROPSKÁ UNIE
EVROPSKÝ FOND PRO REGIONÁLNÍ ROZVOJ
INVESTICE DO VAŠÍ BUDOUCNOSTI



OP PODNIKÁNÍ A INOVACE

ICT v podnicích

2.2 ITP03/1270 ICT in Horoměřice (2012-13)

Since 07/2012 the project *ICT in Horoměřice* in frame of EU programme OP Enterprise and Innovation started in SVUOM Ltd. The project is focused on development of information and communication technology for SVUOM Ltd. as this company building a new department in Central Bohemia region, Horoměřice. The creation of webnet in building including the new web page of company is realised.



Centrum of technical standardisation

Technical standards are an important part of technology base for products, equipment, infrastructure, energy production and distribution and many other areas. They are used by engineers, designers, purchasing agents and scientists.

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.

The 34 new or revised standards for corrosion and corrosion protection had been published in year 2012.



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 technical universities (e.g. VSCHT Prague, CVUT Prague, ZČU Plzeň, VŠB- TU Ostrava, TU Bratislava, VŠ Košice) and Academy of Science institutes (AV UTAM) in frame of research projects and as lectors in various type of postgraduate and special courses (ERASMUS projects):

- CVUT, FS and VSCHT - postgraduate course Sd 401 *Corrosion engineer*
- CVUT, FEL - course AE1M13EMP *Ecology of materials and processes*
- CVUT, FSv - course SAHC *Advanced Masters in Structural Analysis of Monuments and Historical Constructions*

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 2012 SVUOM's specialists presented results of their research on many national and international conferences and in national and international journals, e.g.:

- B. Eremias, T. Kubatik, L. Turek, Preliminary study of possibilities of electrochemical noise analysis technique for evaluation of time development of exfoliation corrosion on AlCu4Mg1 alloy in EXCO solution, Proc. of EUROCORR 2012, Istanbul, Turkey
- H. Geiplová, Povrchové úpravy kovů, Teorie povrchových úprav - přehled postupů, příprava povrchu, nátěrové systémy a hodnocení jejich kvality, 978-80-86413-94-5
- H. Geiplová, J. Benešová, M. Páráková, Vliv přípravy povrchu na životnost organických povlaků, Tribotechnika, ISSN 1338-0524, 5(6), pp. 56-61
- L. Mindoš, Defects of powder coating applied on galvanized steel, proceedings of 18th Hot Dip Galvanizing Conference, Senec, Slovensko, 9.-11.11.2012, ISBN 978-80-905298-0-9
- L. Mindoš, Determination of reasons of failure of pool's surface treatment, proceedings of 9. mezinárodní odborný seminář Progresivní a netradiční technologie povrchových úprav, listopad 2012, Brno, ISBN 978-80-87583-02-9
- J. Tidblad, V. Kucera, M. Ferm, K. Kreislova, S. Doytchinov, A. Scepanti, T. Grontoft, T. Yates, D. de la Fuente, O. Roots, T. Lombardo, A. Verney-Carron, S. Simon, M. Faller, L. Kwiatkowski, J. Kobus, C. Varotsos, C. Tzanis, L. Krage, M. Schreiner, M. Melcher, I. Grancharov, N. Karmanova, Effects of air pollution on materials and cultural heritage: ICP materials celebrates 25 years of research, International Journal of Corrosion, Volume 2012 (2012), ISSN 1687-9325

- Seidl, D., Jančíková, Z., Košťal, P., Ružiak, I., Kopal, I., Kreislová, K., Exploitation of Artificial Intelligence Methods for Prediction of Atmospheric Corrosion, Defect and Diffusion Forum, Volumes 326 - 328, 2012, p. 65-68, 2012, ISBN 978-3-03785-400-6
- V. Krivy, K. Kreislova, Experimental Investigation Of Corrosion Losses On Weathering Steel Structures, XIIIth Bilateral Czech/German Symposium, Telč, June 5th - 8th, 2012
- I. Houska, K. Kreislová, J. Děd, P. Novák, Restaurování bronzového jezdeckého pomníku Jana Žižky z Trocnova v Praze na Vítkově, Koroze a ochrana materiálu 56(3) 76-82 (2012)
- K. Kreislová, H. Geiplová, Evaluation of corrosion protection of steel bridges, Procedia Engineering 40, ISSN 1877-7058, 2012, pp. 229 – 234
- K. Kreislova, Zinc coatings lifetime determination in the atmospheric environment, proceedings of Intergalva, Paris, June 11 – 14.2012

SVUOM manages web page in Czech and English language www.svuom.cz. This web page was under reconstruction in 2012.

Licences

The protection of industrial designs by its registration in the register is intended for the design solutions. The product means an industrially or hand-made three-dimensional or two-dimensional object. In the Czech Republic a central body of state administration is Industrial Property Office which performs a function of a patent and trademark office.

Training

SVUOM Ltd. offers training for professionals working in construction and engineering meeting the corrosion and corrosion protection problems. In 2012 SVUOM specialists gave lectures at courses in co-operation with Institute for International Research GmbH (Maintenance of poles), CzechInvest (Corrosion protection for export), ŠKODA WELDING, etc. The training for companies was realised in COLORLAK a.s.



Statutory and Supervisory Bodies of the SVÚOM Ltd.

Executive Directors

The Executive directors are elected by general meeting of shareholders for 3 years period. In 2012 the executive directors were:

- Dipl. Ing. Hana Geiplová
- Dipl. Ing. Kateřina Kreislová, Ph.D.

Supervisory Board

The Supervisory Board is elected by general meeting of shareholders for 3 years period. In 2012 the members of Supervisory Board were:

- Chairman of the Supervisory Board – Dipl. Ing. Tomáš Kubatík, Ph.D. (back out 05/2012)
Dipl. Ing. Miroslav Přebyl
- Members – Dipl. Ing. Jaroslava Benešová
Dipl. Ing. Dagmar Knotková, CSc.

Employees and competence

The most important asset of a knowledge-based institute like SVÚOM is its intellectual capital. Due to the economical situation in the ČR, there was a reduction in the number of employees. In 2012 the SVÚOM had a total of 20 employees from which 15 have university degree including 2 doctors.

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 specialist is convenor of ISO/TC156/WG 4 *Atmospheric corrosion testing and classification of corrosivity of atmosphere* and chairman of national technical committee UNMZ/TNK 32 *Corrosion protection*.

SVUOM's specialists are certificated as corrosion engineers 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 thousand CZK)

Balance sheet	2012
tangible fixed assets	9.164
revenues from sold goods	11.169
subscribed capital	5.871
consolidated profit of current accounting period	843

The SVÚOM 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 2012 the some new instruments and equipments had been purchased to improve the quality of corrosion and protective coatings measurement. The investment into Department of Corrosion Engineering, Horoměřice in 2012 was cca 500 thousand CZK.