

History of University



In 1877 the Technical Academy was renamed into the Polytechnic School with the rights of a higher technical educational institution of the Austro-Hungarian Empire.

Lviv Polytechnic National University is the oldest technical educational institution in Ukraine and Eastern Europe. The history of Lviv Polytechnic University dates back to the foundation of the Technical Academy in Lviv in 1844.

In June 1920 the new statute of the Polytechnic School was adopted and it was renamed into Politechnika Lwowska. In the 1930s the Polytechnic consisted of seven institutes: architectural, chemical, mechanical, land and water engineering, agriculture and forestry, general. In October 1939 Politechnika Lwowska was renamed into Lvov Polytechnic Institute.



KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY



Lviv Polytechnic National University



Today about 30 000 students study here in 41 directions.

Over 185 doctors of science, professors and about 1000 candidates of science, associate professors work at the University.

It consists of 16 institutes, 82 departments.

Structure of the University

Institute of Applied Mathematics and Fundamental Sciences

Institute of Architecture

Institute of Humanities and Social Sciences

Institute of Geodesy

Institute of Building and Environmental Engineering

Institute of Power Engineering and Control Systems

Institute of Engineering Mechanics and Transport

Institute of Chemistry and Chemical Technologies

Institute of Telecommunications, Radioelectronics and Electronic Engineering

Institute of Computer Technologies, Automation and Metrology

Institute of Computer Sciences and Information Technologies

Institute of Economics and Management

Institute of Distance Education

Institute of Postgraduate Education

Lviv Institute of Land Forces

International Institute of Education, Culture and Relations with Diaspora

Institute of Computer Science and Information Technologies



Departments:

1. automatic control systems;
2. computer-aided systems;
3. software department;
4. information systems and networks;
5. applied linguistics

Institute of Computer Science and Information Technologies trains qualified professionals in :

1. computer science
2. information management systems and information technologies
3. design technologies
4. software for automation systems
5. intelligent decision making
6. applied linguistics
7. computer-aided science and publishing
8. software engineering

Computer Aided Systems Department



Computer Aided Systems Dept was created
in 1989 on the base of Department of Radio
Devices' Design and Manufacturing
(Radio-engineering faculty)

Head of the Dept
prof **Łobur Mychajło**, DSC

Staff

30 persons are employed at the Dept.

Among them:

- 2 professors;
- 15 associate professors;
- 6 senior assistants;
- 7 assistants.
- 10 PhD students

Conferences

- THE EXPERIENCE OF DESIGNING AND APPLICATION OF CAD SYSTEMS IN MICROELECTRONICS (CADSM) (since 1996)
- PERSPECTIVE TECHNOLOGIES AND METHODS IN MEMS DESIGN (MEMSTECH) (since 2005)
- CAD IN MACHINERY DESIGN. IMPLEMENTATION AND EDUCATIONAL PROBLEMS (CADMD) (since 1992)

CADSM Topics

MODELLING AND OPTIMIZATION FOR TECHNOLOGICAL PROCESSES

Modeling and simulation of hydro- and gasdynamics processes. New materials in microelectronics. New technology of IC and MEMS industry. Practical realization and industrial application. Tasks of technological processes testing. Tasks of reliability estimation.

MODELS AND METHODS FOR RADIOELECTRONICS DEVICE AND SYSTEM DESIGN

Signal processing in radioelectronic system and telecommunications. Telecommunications and radioelectronic design tools. Electronic and computer tools in biomedical engineering. Methods and tools of digital signal processing

DESIGN OF SPECIALIZED SYSTEMS AND DEVICES

Specialised computer system. Computer system and networks. Data and knowledge bases. Design of MEMS elements. CAD systems for MEMS design.

OPTIMAL DESIGN PROBLEMS

Tasks of optimal design. Object-oriented design methods. Combinatorial and graph tasks of huge size. Constructor design of radioelectronics means. Design solving verification. Thermal problems in microelectronics.

CAD MODERN INFORMATION TECHNOLOGY

Visual modeling. Development and analysis remote design tools. Concurrent and distribution systems. Distribution computing in networks. Technology and system automated processing text and graphics information. Perspective directions of modern mathematical and software development.

MODELS AND METHODS FOR MICROELECTROMECHANICAL SYSTEMS

Mathematical model of sensors and actuators. Microsystems modeling and design. New microelectronic technologies.

MEMSTECH Topics

- Analysis, modeling, research and design methods of microsensors and microactuators;
- Software systems, models, algorithms, methods and strategies of embedded systems design;
- Field issues in embedded systems modeling and design;
- Issues of testing, verification, reliability and optimization in embedded systems modeling and design;
- Sensors and actuators systems, nanotechnology;
- Applications for electron device design;
- Information Technology. Engineering Application of Informatics. Engineering Education.

Scientific Activity

1. Automation of design of microelectronic devices;
2. Design, modeling, simulation and optimization of MEMS and other microsystems;
3. Automation of design of complicated organizational systems;
4. Development of complicated information systems for simulation of ecological and economic processes;
5. Design and simulation of technological processes.

1. Automation of design of microelectronic devices



Prof. Lobur M.

- Algorithms and applications for topological synthesis of hybrid integral micro-assemblies and electronic circuits.

- Modern methods for defects analysis in microelectronic circuits



Dr Tkatchenko S.

- Optimization tasks solution on graphs

- Research of graphs' isomorphousness

Publications

- Білаль Раді А'Ггель аль Забі, Ткаченко В., Ткаченко С.П. **Алгоритми встановлення ізоморфізму графів.** // Proceeding of the IVth International Conference of Computer Science and Information Technologies CSIT'2008. - Lviv, 2008 - P.112-113
- Bilal Al-Zabi, Serhiy Tkatchenko. **Models of Circuits and Their Elements for Functional Decomposition and Verification at the Stage of Computer Systems PC Board Design.** Proceeding of the IXth International Conference CADSM'2007/ Lviv, Polyana, p.286-287.
- Dmitry Korpyljov, Tatyana Sviridova, Serhiy Tkachenko. **Using of Genetic Algorithms in Design of Hybrid Integrated Circuits.** Proceeding of the IXth International Conference CADSM'2007/ Lviv, Polyana,p.302.
- Rostyslav Kryvyy, Serhiy Tkatchenko. **VLSI Topology Synthesis Using the Method of Parallel Genetic Algorithms.** – Perspective Technologies and Methods in MEMS Design. Proceeding of the IVth International Conference of Young Scientists MEMSTECH'2007, Lviv – Polyana, 2007 - p.p. 151-152.
- Bilal Al-Zabi, Serhiy Tkachenko. **Ways to establishing Necessary Features of Circuits Equivalence.** – Perspective Technologies and Methods in MEMS Design. Proceeding of the IVth International Conference of Young Scientists MEMSTECH'2007, Lviv – Polyana, 2007 - p.p.153.

2. Design, modeling, simulation and optimization of MEMS and other microsystems;



Prof. Lobur M.



Dr Tesluk W.

- Design and simulation of micro electro-mechanical systems (MEMS).
- Development of automated subsystems for MEMS' design
- Mathematical simulation of MEMS' technological processes - diagnosing deviations in technological processes based on functional control and system testing results; expert systems design.

Publications

- M. Lobur, V. Tesljuk, K. Kolesnyk, M. Pereyma **Thermomechanical characteristics research of actuators based on the bimetallic plates** // Proceedings Of The 1-st International Conference "Advanced Computer Systems And Networks: Design And Application" (ACSN-2003). September 24-26, 2003, Lviv, Ukraine, pp. 39 – 42.
- Roman Zaharyuk, Vasyl Teslyuk, Volodymyr Karkulyovskyy. **Using Petri Nets in Capacitive Microaccelerometers Design**. III International Conference of Young Scientists MEMSTECH'2007, Lviv, Polyana.
- Теслюк В.М., Загарюк Р.В., Тарік (Мох'д Тайсір) Алі Аль Омарі, Бобало С.І. **Розробка VHDL-AMS моделі ємнісного акселерометра зустрічно-стрижневої конструкції** // Вісник Національного університету «Львівська політехніка»: Комп'ютерні системи проектування. Теорія і практика. - Львів, 2008. – № 626. – С. 110 - 115.
- Лобур М.В., Теслюк В.М., Каркульовський В.І., Тарік (Мох'д Тайсір) Алі Аль Омарі **VHDL-AMS модель схемотехнічного рівня для автоматизації розробки п'єзоелектричного мікрофона** // Матеріали науково-методичної конференції „Сучасні проблеми телекомунікацій і підготовка фахівців в галузі телекомунікацій - 2008", - Львів, 28 - 30 жовтня, 2008 р. – С. 40 – 43.
- Teslyuk V., Lobur M., Denysyuk P. **Mathematical Model for Optimization of Input Desing Parameters Of Integrated Electrostatic Sensors** // Proc. of XIII Polish-Ukrainian Conf. on CAD in Machinery Design – Implementation and Educational Problems. – Jurata, Poland, 2005, - P. 71-78.
- M. Lobur, V. Antonyuk, I. Kolodchak, V. Korolyov, V. Belyakov, K. Rudenko. **Performance Attributes Improvement for Jet Volley Fire Systems (JVFS) of Grad and Uragan Type through Navigation Subsystem Application Based upon MEMS Sensors.** //Proc. of IXth International Conference on the Experience of Designing and Application of CAD Systems in Microelectronics, February, 20-24, Polyana, Ukraine, pp.560-562.

Non-linear dynamic systems analysis

Publications



Prof. Tymoshchuk

- P. Tymoshchuk and E. Kaszkurewicz, "**Synthesis of continuous time second order Winner-take-all Hopfield neural networks using genetic algorithms**", Technical Report TR-17, UFRJ NACAD Laboratory, 2002.
- P.Tymoshchuk and E.Kaszkurewicz, "**A Winner-take-all circuit based on second order Hopfield neural networks as building blocks**", in Proc. Int. Joint Conf. Neural Networks, vol. II, Portland, OR, 2003, pp. 891-896.
- P.Tymoshchuk and M. Lobur, "**Optimization of WTA neural network by genetic algorithms**", in Proc. Int. Workshop "East-West Design & Test", Odesa, Ukraine, Sept. 15-19, 2005, pp. 156-159.
- P.Tymoshchuk and E.Kaszkurewicz, "**A winner-take all circuit using neural networks as building blocks**", Neurocomputing, vol. 64, 2005, pp. 375-396.
- P.V.Tymoshchuk, "**Stability analysis of continuous-time model of K-Winners-Take-All neural circuit**", in Proc. XVI Ukrainian-Polish Conf. "CAD in Machinery Design. Implementation and Educational Problems", Lviv, Ukraine, October 13-14, 2008, pp. 29-30.

Effective algorithms synthesis

Publications

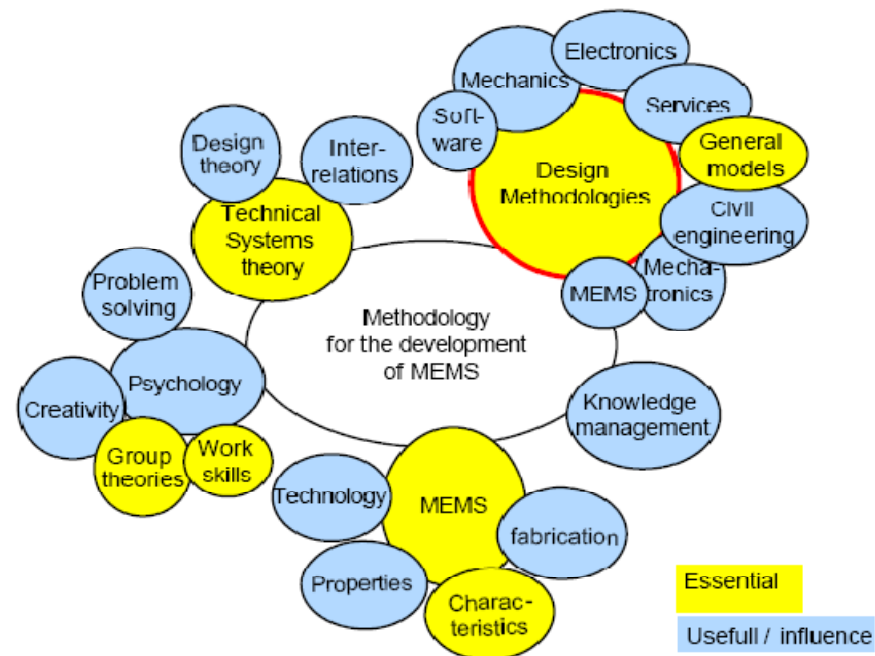


Dr Protsko I.

- Патент 19531A Україна, G06F7/04. **Пристрій канонічного розкладу числа на множники.** /Процько І.О., Рашкевич Ю.М., (Україна) /Заявл. 13.02.96; Опубл. 02.12.97, Бюл. №6.
- Патент 25782A Україна, G06F15/332, G01R23/16. **Пристрій формування значень тригонометричних функцій для цифрового аналізатора спектра.** /Процько І.О., Рашкевич Ю.М., (Україна) /Заявл. 25.12.96; Опубл. 30.10.98, Бюл. №5.
- Патент 25783A Україна, G06F7/04. **Пристрій для формування і відбору переставлень.** /Процько І.О., Рашкевич Ю.М., (Україна) /Заявл. 24.12.96; Опубл. 30.10.98, Бюл. №5.
- Деклараційний патент 34614A Україна, G06F7/00, G06F15/00. **Пристрій для обчислення швидкого трансформування Фур'є.** /Процько І.О., Радомський В.А., (Україна) /Заявл. 28.07.98; Опубл. 15.03.2001, Бюл. №2.
- I. Protsko, **Adaptive synthesis to transform size of Fast Fourier Algorithm.** // Proceeding of the VII International Conference CADSM 2003, Lviv-Slavske, 18-22 february, 2003. -p.230-231.
- I. Prots'ko, **The Efficient Algorithm of Discrete Cosine Transform.** //Proceeding of the IX International Conference CADSM'2007, Poljana, 20-24 february, 2007. -p.163-164.

MEMS investigations

- Current Situation in MEMS:
 - Decreasing feature sizes
 - Complicated process techniques
 - Technological constraints (max. accuracy of etching, etc.,)
- Main Goal: Achieve a methodology that considers process variations in the design phase and makes its performances more robust to these process variations



Courtesy: Robert Watty, University of Stuttgart

A robust design methodology for MEMS / NEMS is needed

AUTOMATED PROCESS ENGINEERING OF PIEZORESISTIVE MICROSENSOR'S PARAMETERS CALCULATION

The technology and subsystem for execution of automated calculation and creation of the technical documentation of the piezoresistive microsensors with the help CAD/CAM/CAE is presented. The associations between physical values and voltage out from a bridge circuit of piezoresistive microtransmitters are obtained.

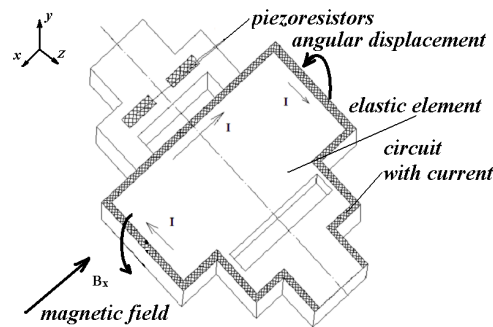


Fig. 1. Constructions of microsensors of a piezoresistive type, where *a, b, c* - microsensors for measuring pressure, magnetic field and thermoelectric couple

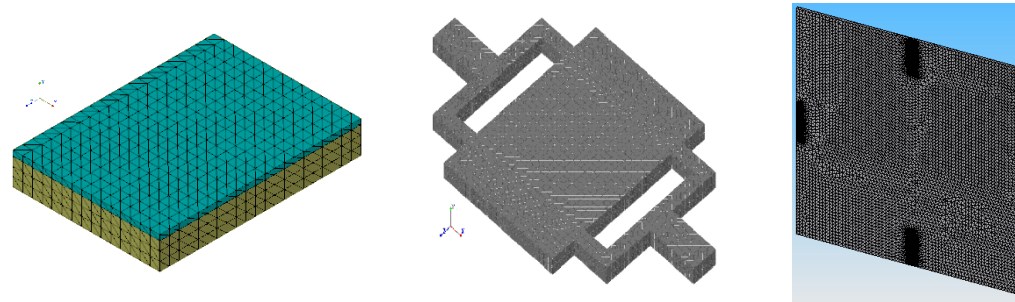


Fig 2. Finite-element models of a microsensor, where *a, b, c* - for measuring pressure, magnetic field and thermoelectric couple

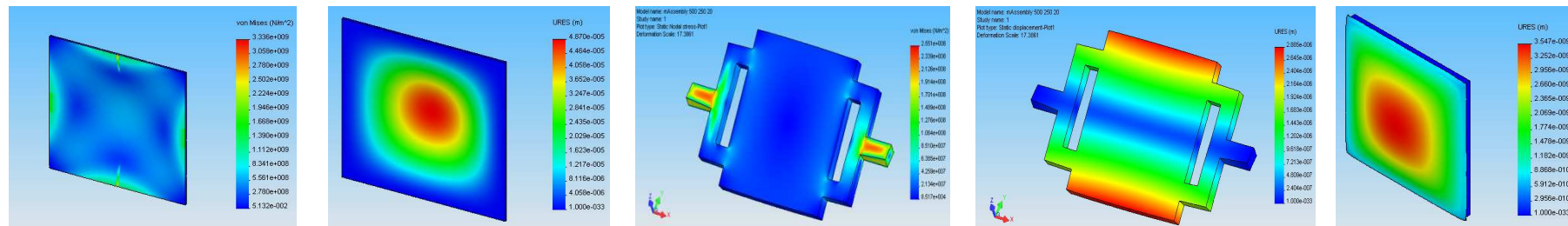


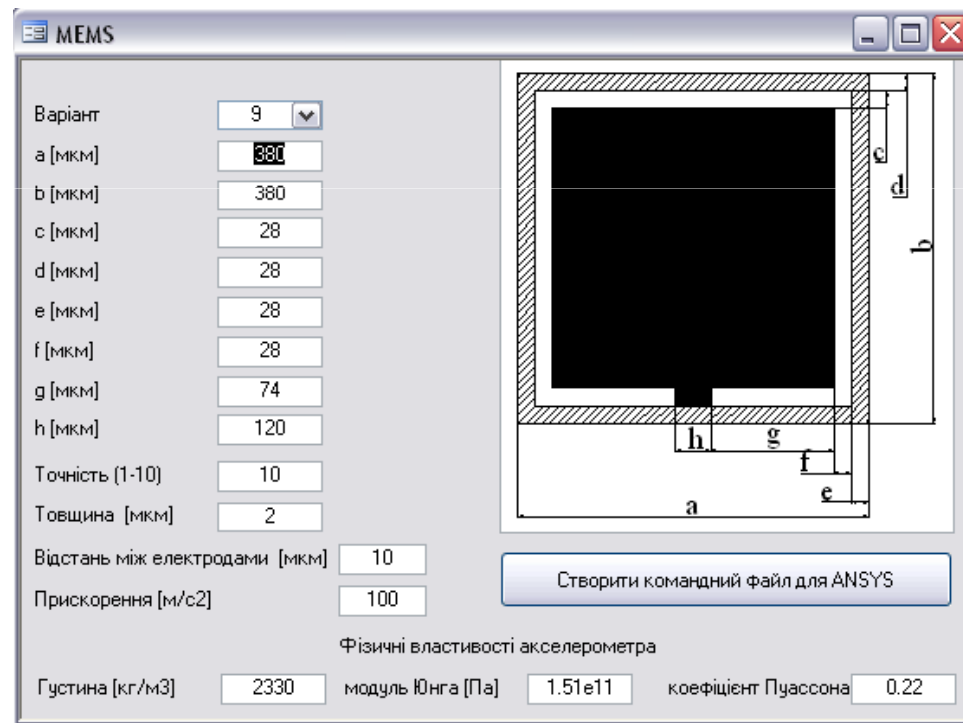
Fig. 3. Stress state of piezoresistive microsensors for measuring: *a, b* - pressure, *c, d* – magnetic field and *e, f* – thermoelectric couple

AUTOMATION DESIGN OF TYPICAL MEMS ACCELEROMETER

The method of rapid analysis of the typical MEMS-accelerometers in the ANSYS environment is presented in the work.

```
/PREP7  
BLC5, , ,300e-6,300e-6  
BLC5, , ,220e-6,220e-6  
BLC5, , ,260e-6,260e-6  
RECTNG,-20e-6,20e-6,-110e-6,-130e-6,  
ASBA, 1, 3  
FLST,2,3,5,ORDE,3  
FITEM,2,2  
FITEM,2,4  
FITEM,2,-5  
VEXT,P51X, , ,0,0,2e-6,,,,  
FLST,3,1,6,ORDE,1  
FITEM,3,1  
VGEN,2,P51X, , , ,10e-6, ,0  
BLOCK,-300e-6,300e-6,-300e-6,300e-6,-7e-6,21e-6,  
FLST,2,5,6,ORDE,2  
FITEM,2,1  
FITEM,2,-5  
VOVLAP,P51X
```

Fig. 1. ANSYS code to create the geometry



3. Automation of design of complicated organizational systems



Dr Mazur W.

- Software and hardware design for organizational and technical systems.
- Development of algorithms and applications in the field of transportation.
- Development of systems for city transport modeling and investigation of its influence upon city noise maps.

Publications

- M.V. Lobur, V.V. Mazur, I.V. Farmaga. **Strategic Planning and Computer-aided Design of Organizational and Technical Systems**. Матеріали 6-ї МНТК "Досвід розробки та застосування приладо-технологічних САПР в мікроелектроніці", 2001, с. 216-217.
- В. Мазур. **"Роль Львова та Львівського регіону в розвитку міжнародного співробітництва України і країн Європейської спільноти у сфері транспорту"**. Четверта міжнародна науково-практична конференція "Стан та перспективи транспортної сфери у Львові", Львів, вересень 2007.

4. Development of complicated information systems for simulation of ecological and economic processes



Dr Matviyiv O.



Dr inż. Kernitsky A.

- Development of complicated information systems for simulation of ecological and economic processes.
- Systems for collaborative design
- Groupware systems
- Commercial database design and programming;
- Design of complicated information systems MRP/ERP;
- Simulation and design of complicated processes моделювання та аналіз складних процесів методами нечіткої логіки;
- математичні обчислення МСЕ;
- автоматизоване проектування складних об'єктів і систем в CAD/CAM/CAE

Publications

- Andriy Kernytsky, Mykhaylo Lobur "**Omega LP**" - **Design and production data management system for small machine-building enterprise** // Proceedings of XIII Konferencja nt - Metody i srodki projectowania wspomaganego komputerowo", Warszawa, listopad 2001.
- Oleh Matviyiv, Mykhaylo Lobur, Olga Lebedeva. **Virtual Collaborative Design Environment for Distributed CAD Systems**. IXth International Conference on the Experience of Designing and Application of CAD Systems in Microelectronics, February, 20-24, Polyana, Ukraine.
- Mykhaylo Lobur, Olga Lebedeva. Oleh Matviyiv. **The Analysis of design Management Task in Distributed MEMS CAD Tools**. III International Conference of Young Scientists MEMSTECH'2007, Lviv, Polyana.

OmegaLP system



OMEGA.LP - Microsoft Internet Explorer

Address: http://localhost/OmegaLP42/route.php?Action=ManageRules

Система технічного документообігу

Головна | [в цьому вікні]

Правила міжопераційних маршрутів

Список правил / Правила:

№	Тип правила	Share Size	Форма	дуг	Тип розм.	Діаметер
1	Номер 1:	Share Size	Знак	дуг	Номер 2:	0
2	Матеріал:	Standard Type	лист	шестигранн		
3	Update	Cooperation Type	профіль	стрічка		
4		Material Type	швеллер	труба		
5		Share Type	балка	прокладка		

Перелік операцій:

- 43/08 Токарно-гвинторізи
- 41/02 Шпоночно-фрезерні
- 41/20 Універсально-фрезерні
- 47/22 Шпоночно-фрезерні
- 41/05 Вертикально-свердильні
- 42/09 Внутрішньошліфувальні
- 41/07 Круглошліфувальні
- 41/13 зубофрезерні
- 42/61 Гартування у печі
- 41/62 Нормалізація
- 41/07 Круглошліфувальні
- 42/09 Внутрішньошліфувальні
- 41/13 зубошліфувальні
- 41/71 Хім. Окиснення
- 42 Складальний цех

Add New Delete

OMEGA.LP - Microsoft Internet Explorer

Address: http://localhost/OmegaLP42/project.php?Action=Stage&StageID=1

Система технічного документообігу

Головна | [в цьому вікні]

Введення вихідних даних

Вузлик: Кришка КС-4574.28.209 К

Деталі вузлика:

Тип вузлика: деталь

Батьківський вузол: КС-4574.28.210 СК

Розмір листа: А4 (210x297)

Позиція: 24

Назва: Кришка

Формування: відливання

ФОРМА: лист

Розмір: 189x45

Матеріал: Сталь 50 ГОСТ 1050-88

OMEGA.LP - Microsoft Internet Explorer

Address: http://localhost/OmegaLP42/printing.php?Action=Process&PrintingID=2

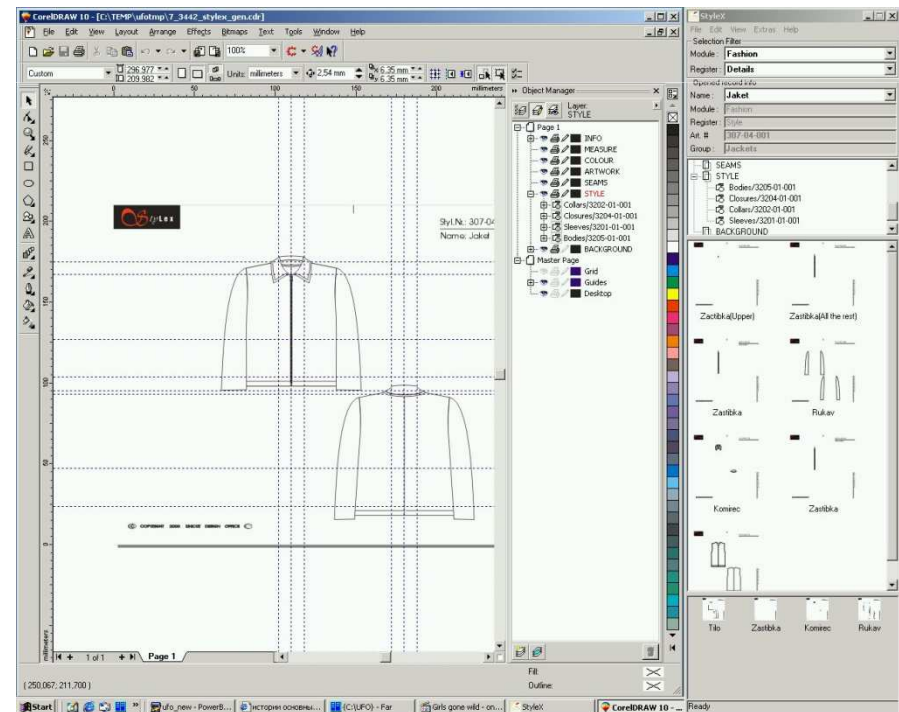
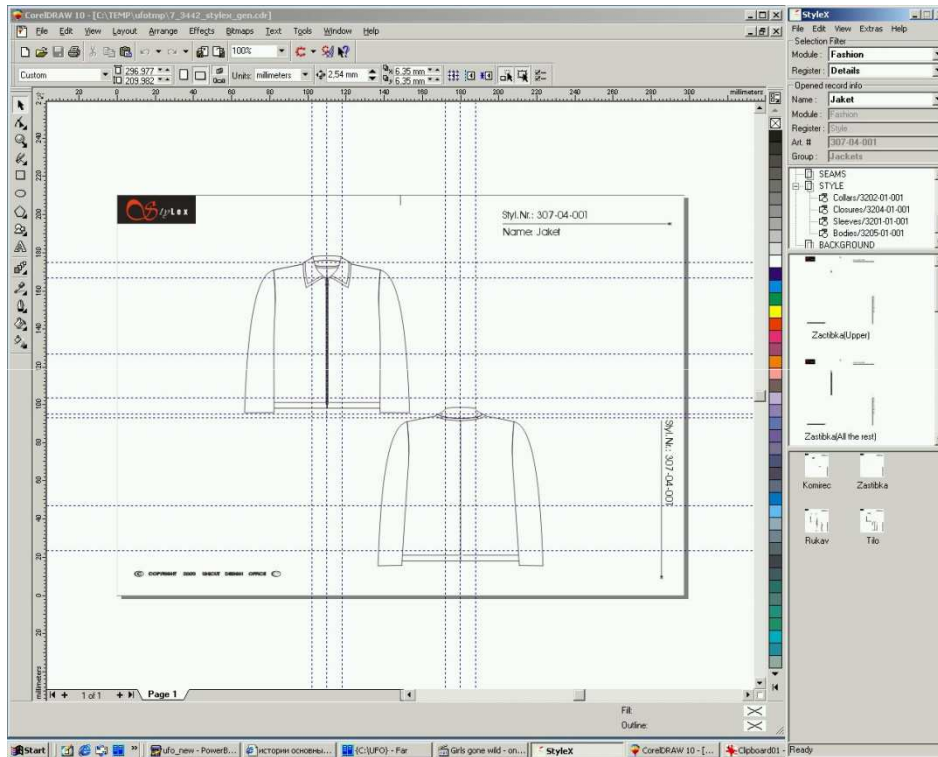
Система технічного документообігу

Головна | [в цьому вікні]

Техпроцес №1

Operation #	Operation Name	Solution and Material Composition			Modes of Operation			Tech. loss rate	Application by
		Name	Standard	Material expenditure gr/m ²	Viscosity, g/4-c	t, C	Time		
2	Знежирювання	Вайт-сприт	ГОСТ 3134-78	70	0	18-23	0	1.55	spray
3	Сушіння	Поверх		0	0	18-23	1	0	
4	Захист покриття, що не фарбуються	Солдол технічний	ГОСТ 4366-76	400	0	18-23	0	1.1	brush
5	Протравлення	Гамма-а	ГОСТ 5354-79	20	0	0	0	0	
6	Нанесення 1-го шару грунтовок	Грунтовка ГФ-020		82	24-26	18-23	0	1.55	spray
7	Нанесення 1-го шару грунтовок	Сольвент	ГОСТ 1928-79	12	0	18-23	0	1.55	spray
8	Сушіння	Поверх		0	0	0	2	0	
9	Нанесення 2-го шару грунтовок	Грунтовка ГФ-020		82	24-26	18-23	0	1.55	spray
10	Нанесення 2-го шару грунтовок	Сольвент	ГОСТ 1928-79	12	0	18-23	0	1.55	spray
11	Сушіння	Поверх		0	0	0	2	0	
12	Нанесення шпаклівки	Шпаклівка ГВ-0075	ТУ 6-10-1283-77	70	24-26	18-23	0	1.55	spray
13	Нанесення шпаклівки	Розчинник N646	ГОСТ 18188-72	124	0	0	0	1.55	spray
14	Сушіння	Поверх		0	0	18-23	0	0	
15	Шліфування	Шліфувальна шкурка РСС 600x3064v8A	ГОСТ 13344-79	0.11	0	0	0	0	
16	Нанесення емаляльного шару емалі	Емаль НУ-256	ТУ 6-10-1191-73	103	24-26	18-23	0	1.55	spray
17	Нанесення шпаклівки	Розчинник N646	ГОСТ 18188-72	124	0	0	0	1.55	spray
18	Сушіння	Поверх		0	0	18-23	0.2	0	
19	Нанесення 1-го шару емалі	Емаль НУ-256	ТУ 6-10-1191-73	103	24-26	18-23	0	1.55	spray
20	Нанесення 1-го шару емалі	Розчинник N646	ГОСТ 18188-72	124	0	0	0	1.55	spray
21	Сушіння	Поверх		76	0	18-23	1	0	
22	Нанесення 2-го шару емалі	Емаль НУ-256	ТУ 6-10-1191-73	103	24-26	18-23	0	1.55	spray
23	Нанесення 2-го шару емалі	Розчинник N646	ГОСТ 18188-72	124	0	0	0	1.55	spray
24	Сушіння	Поверх		0	0	18-23	1	0	

StyleX



PowerPlans



5. Design and simulation of technological processes.



Dr Teslul W.



Dr Panchak R.

Microelectronics: diffusion; Ionic alloying; epitaxy; oxidation.

Автоматизація технологічної підготовки виробництва (радіотехні та машинобудівні підприємства)

Publications

- Tesluk V., Korbetskyy O. A Program for **Modeling of Technological Routes of VLSI Fabrication - «ProMIC-T»** // Technical Proc. of the Second Intern. Conf. on Modeling and Simulaion of Microsystems. - Puerto Rico, USA, 1999. – P. 99-101.
- Teslyuk Vasyl, Korbetsky Orest **Usage of Monte-Carlo Method for Ion Implantation Simulation** // Proc. of Inter. Conf. on Modern Problems of Telecommunication, Computer Science and Engineers Training, (TCSET'2000). – Lviv-Slavsko, Ukraine, 2000. - P. 33.
- Denysyuk P., Lobur M., Teslyuk V., Jendzykewicz Z. **Problems of Construction of Systems of Automation of Designing Hydrostatic Systems by a Method of Function Blocks** // Proc of the VII-th Intern. Conf. on The Experience and Application of CAD Systems in Microelectronics (CADSM'2003). – Lviv –Slavske, Ukraine, 2003. – P. 69 – 70.
- Lobur M., Teslyuk V., Kosobutckiy P. **3d-Dimensional Mathematical Models of Technological Processes of MEMD** // Proc. of the XI Polish-Ukrainian Conf. on "CAD in Machinery Design – Implementation and Educational Problems". - Warsaw University of Technology Instutyte of Machine Design Fundamentals Press WARSAW, Poland, 2003. – P. 27 – 35.

Thank You
for Your attention

