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CONTENT

Abstract:
Maintenance involves preventive (planned) and unplanned actions carried out to retain a system at or restore it to an acceptable operating condition. Optimal maintenance policies aim to provide optimum system reliability and safety performance at the lowest possible maintenance costs. Proper maintenance techniques have been emphasized in recent years due to the fact that the safety and reliability requirements of system, increased complexity and costs of material and labor are increasing.

Abstract:
The carrying of heavy trains on large inclines can produce the breaking of the draw hook. The railway freight operator, want to carry long trains because of the economic reasons. This paper will present the steps of tests performing in purpose to measure the tensile forces from the locomotive draw hook equipped with strain gages. The purpose of the tests was increasing the tonnage of the trains on the inclines (the tonnage of the trains on the inclines is restricted by railway regulations).

Abstract:
The traditional selling approach has suffered tremendous changes lately related to a major shift in the way the sales force is approaching the existent and potential customers. The new developments can be classified into many categories, but we would like it concentrate on few major developments that would dramatically impact the way sales force is evaluating the sales approach. We can classify these developments into 2 major categories: technology and conceptual. In the current context, we would like to analyze the specific changes in each category and a better understanding of the specific characteristics related to each category.

Abstract:
The irons destined to these cast rolls belong to the class of low-alloyed irons, with reduced content of chrome, nickel and molybdenum. The technological instructions firmly state the elements required raising the quality of rolls, but the limits can be extensive or limited. Depending on the number of the technological parameters, it was chosen the analysis of multiple regressions studying the influence of the chemical composition upon the hardness, through the mathematical modeling.
The technical conditions, which are imposed to the cast iron rolls in the exploitation period, are very different and often contradictory. The obtaining of various physical and mechanical properties in the different points of the rolls meets difficult technological problems in the industrial condition. This supposes us to know many technological factors, which lead to the exploitation of this deformation equipment.
The experimented researches, as well as the optimization of the manufacturing technology, allow the conclusion of direct results for the rolls. The beneficiaries of these results are the unit in which the rolls are manufactured, as well as the unit that exploits them.

Abstract:
The paper presents an analysis regarding the influence of working typical factors about the shallow destruction phenomena between wires in contact. It was studied the influence of contact pressure and the relative displacement between wires concerning the life-time of wire ropes.
There is presented as a conclusion that the life-time of wires is decreasing at the increasing of the average pressure between the wire rope and the wrapping up roll. The destruction phenomenon of wires is increasing when increasing the frequency of the alternant bending process of wire rope around the roll.

Abstract:
To be able to choose the right photovoltaic equipment, starting from modules through inverters, for grid connected plants, at least one year of consistent evaluations of system performance are needed. One of those performance parameters that allow the detection of operational problems and facilitate the comparison of systems is given by the final yield factor and the performance ratio.
Based on the grid connected photovoltaic plant at the University 'Eftimie Murgu' in Resita, injecting energy in the public grid since spring 2008, we define and analyze the performance ratio and the final yield factor. With these two factors given, we are able to assure a critic overview of the plant performance.

Abstract:
In this work are presented the types of amplifier stages with field-effect transistors, as well as the diagrams of the low-signal amplifiers achieved with TEC-J for the three connection types: common-source, common-grid and common-drain. Also, using the EWB-Multisim 8 program, it was simulated the operation of the amplifier with TEC-J in common-source connection, the amplifier with TEC-MOS in common-drain connection and the cascode amplifier with two TEC-J transistors.

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[1.] I. DAVID, [2.] F. BERBENTEA, [3.] M. ŞTEFANUŢ, [4.] L. GEORGESCU,
[5.] G.BUJANCĂ, [6.] T.TRAŞCĂ, [7.] M.DANCI, [8.] OANA DANCI

THE HEAVY METALS MONITORING IN CANNED VEGETABLES MIX

Abstract:
The paper proposes some possibilities for heavy metals detection in canned vegetables mix: Cr, Fe, Pb, Cd, Sn, Al, Zn, As . The heavy metals concentrations have been determinate by AA spectrometry and electrochemical methods: cyclic voltammetry. The monitoring of heavy metals in canned vegetables mix can help evaluate and improve the insufficiently developed technology.

Keywords:
vegetables mix, heavy metals, AA spectroscopy, cyclic voltammetry

INTRODUCTION

Vegetables mix and similar products are widely used for taste enhancement of various food products. Apart from their taste properties they also have a high nutritive value due to the content of easily retainable sugars, vitamin C, carotenoids and mineral salts.
Vegetables mix is a produce conserved through decrease in humidity, thus preventing the evolution of microorganisms. Microorganisms require a certain minimum amount of water to develop; bacteria require 35%, yeasts 25% and molds only need 10%.

EXPERIMENTAL

Samples preparation

Vegetables mix products have been weighed and treated by concentrated nitric acid (67%, Merck, heavy metals free). Samples digestion has been achieved in a 1000W MWS-2 – Berghof type microwave oven using a three-step program: T_1=160°C, t_1=15 min., P_1=40-60% from total power, T_2=210°C, t_2=15 min., P_2=60-80%, T_3=210°C →100°C, t_3=15 min., P_3=0%.Thus resulted solutions have been completed with ultrapure water (RO System Operating Barnstead apparatus) to equal volumes in 25 ml calibrated flasks.

Methods of analysis. AA Spectrometry

The heavy metals content has been determinated by AA spectrometry (International Standard ISO 15586:2003) and cyclic voltametry (Koryta , 1993), i=f(E). AA spectrometry has been achieved with novAA 400 G type spectrometer - Analytik Jena - Germany, equipped with graphite furnace, WinAAS 3.17.0 software for evaluation, control and result presentation, a so-called cookbook, for every element, and a HS 55-1 hydride generator. Calibration curves have been plotted using standard solutions of metals in search.

Electrochemical Methods

Heavy metals such as Sn, Fe, Zn at the electrode surface are affcted by characteristic redox phenomena with can be used to determine their

concentration. The voltammograms i=f(E) are obtained using PGZ 402 Voltalab, with VoltaMaster 4, version 7 software (User's manual, Voltalab®,2008). A 50 cm³ BEC/EDI X51 V001 electrochemical cell, from Radiometer Copenhagen is part of the Voltalab system. Platinum electrodes (S_{work}=7.85 mm², S_{aux}=50 mm²) and standard calomel electrode (SCE) with 0.1M HNO_3 support electrolyte have been used in experiments. Recording speed was 50 mV/min. at an apparatus sensitivity of 10 mA. Calibration curves for Fe and Sn have been plotted using metals standard solutions as I_{peak}=f(conc.).

RESULTS AND DISSCUTIONS

Vegetables mix products are obtained through processing of fully mature tomatoes, beans, onions, papricas. Vegetables concentrates are used in the food industry to enhance the taste and nutritive value of various products. There are three phases in the vegetables mixt production technology: obtaining the brute vegetables mixt, conditioning and packaging the product (HOTARARE nr.1197, 2002; ORDIN 1050, 2006). When packaging into metallic cans the heavy metals content may exceed the safety limits, and in turn may be detrimental to public health. The two proposed analysis methods have the advantage of being fast and reliable (result accuracy). Five types of these products have been studied, both local and imported: four of them packaged in metallic cans and one in glass bottle, for reference.

It has been remarqued the high Cd concentration in Maxim's vegetables mix (Italian product).

For the determination of heavy metals by electrochemical methods, the first step was plotting the calibration curves. The methods used for Fe and Sn by means of cyclic voltametry i=f(E) are presented in Fig.1., Fig.2., Fig.3. and Fig.4.

The electrochemical method has only been applied for the higher concentration of metals Fe and Sn. Extracting Fe from the vegetables mixt products using this method has had no results. (Fig. 5.). Note that the Fe voltamogram is lower than the base line of the support electrolyte.

Sn, on the other hand, is present in the Italian vegetables mixt canned in high concentrations Fig.6 and Fig.7. (samples were taken from right next to where the can is welded, for all samples).The heavy metal concentrations in vegetables mixt determined by AA spectroscopy are presented in Table 1. High values are noted in the case of Fe (which although beneficial to the human body may become an energetic catalyst for some chemicalor biochemical processes), of Sn and of Al, especially in the Italian products.

Table 1. The heavy metal concentrations

No.	Sample	Concentration, ppm							
		Cr	Fe	Pb	Cd	Sn	Al	Zn	As
1.	Vegetables mix Sultan (Romanian product, Turkish licence, metalic can)	0.20	29.5	0.02	0.009	4.45	33.45	7.1	**
2.	Vegetables mix Conserv frig (Romanian product, metallic can)*	0.15	218.00	0.20	0.034	70.78	36.1	4.03	**
3.	Vegetable mix Mib (Romanian product, metallic can)	0.13	16.93	**	0.003	12.5	23.1	6.5	**
4.	Vegetable mix Maxim's, (Italian product, metallic can)*	0.18	41.31	1.9	0.109	14.8	80.2	9.0	**
5.	Vegetables mix Buftea (Romanian product, glass bottle)	0.26	27.61	0.16	0.017	8.24	48.56	8.79	**

** before the samples were taken the vegetables mix was homogenized at 1500 rpm with an IKA-LABORTECHNIK stirrer, with adjustable rotations and display unit observation*

*** under limit detection*

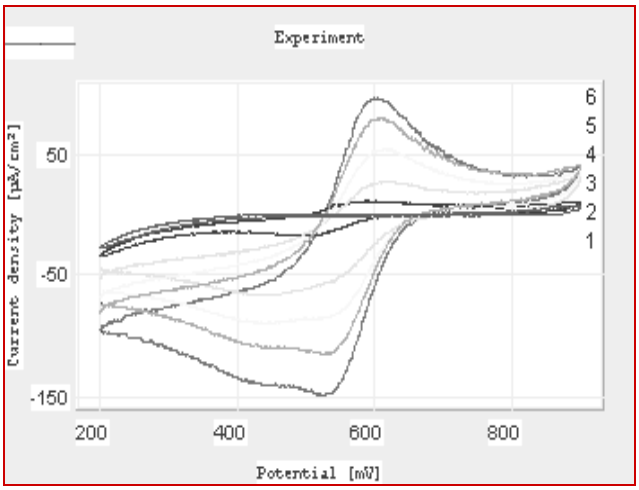

Fig.1. Cyclic voltammogrames for equilibrium $Fe^{3+} + e^- \rightarrow Fe^{2+}$. 1 – support electrolyte HNO3 0.1 M; 2 - c=25.64 mg/L; 3 - c=50.00 mg/L;4 - c=95.24 mg/L; 5 - c=136.36 mg/L; 6 - c=173.91 mg/L

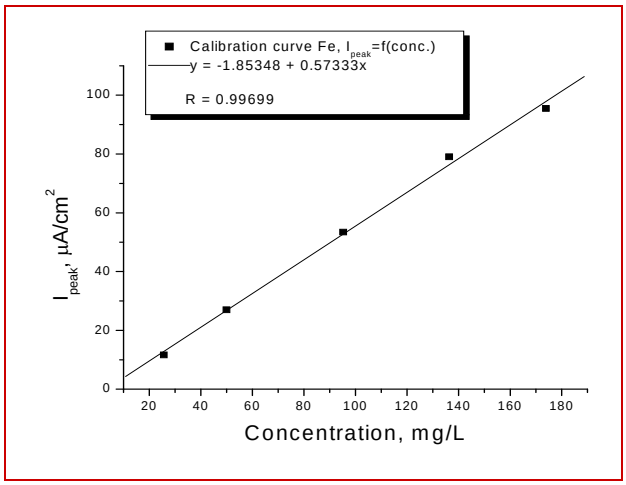

Fig.2. Calibration curve for iron concentration determination in canned vegetables mix, I_{peak}=f(conc.), E_{ESC} = 608 mV

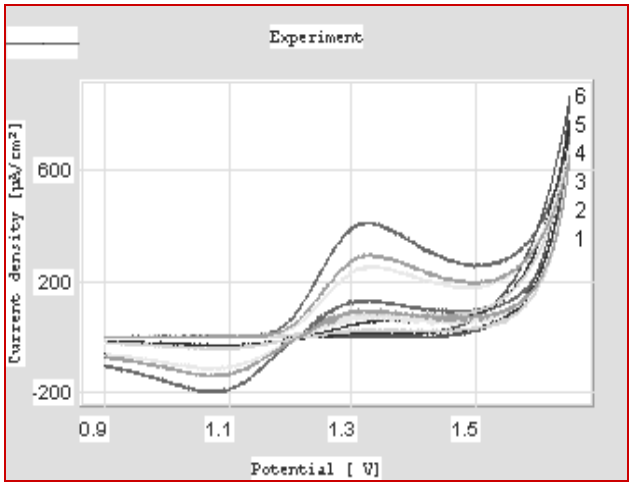

Fig.3. Cyclic voltammogrames for equilibrium $Sn^{4+} + 2e^- \rightarrow Sn^{2+}$. 1 – support electrolyte HNO3 0.1 M; 2 - c=6.8333 mg/L; 3 - c=13.5257 mg/L; 4 - c=20.0816 mg/L; 5 - c=26.5050 mg/L; 6 – c=32.8000 mg/L

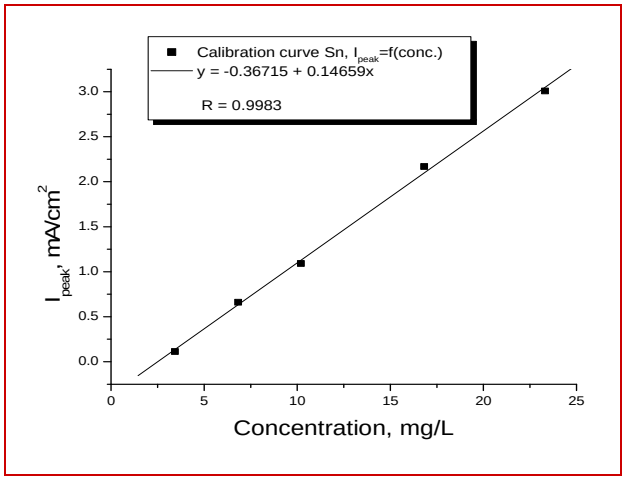

Fig.4. Calibration curve for tin concentration determination in canned vegetables mix, I_{peak}=f(conc.), , E_{ESC} = 1.375 V

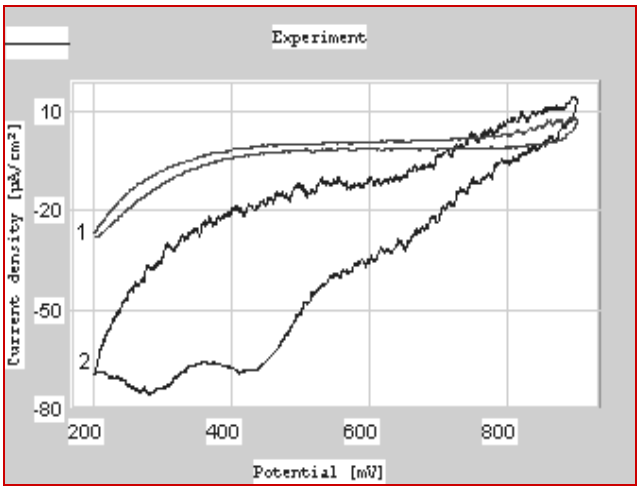

Fig.5. Fe determination in Conserv frig (vegetables mix)

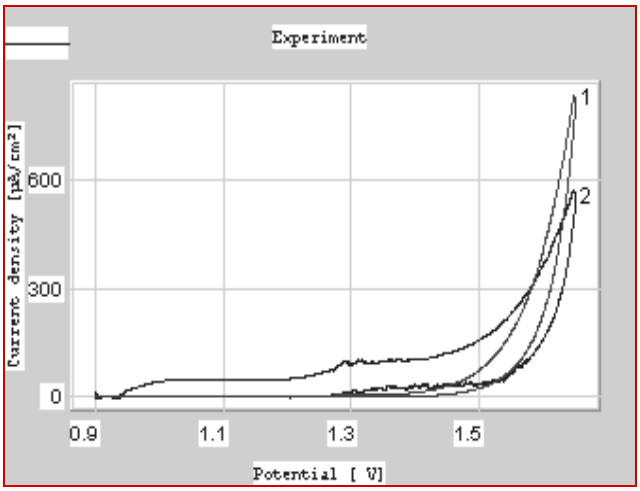

Fig.6. Sn determination in Conserv frig (vegetables mix), E_{ESC} = 1.375 V

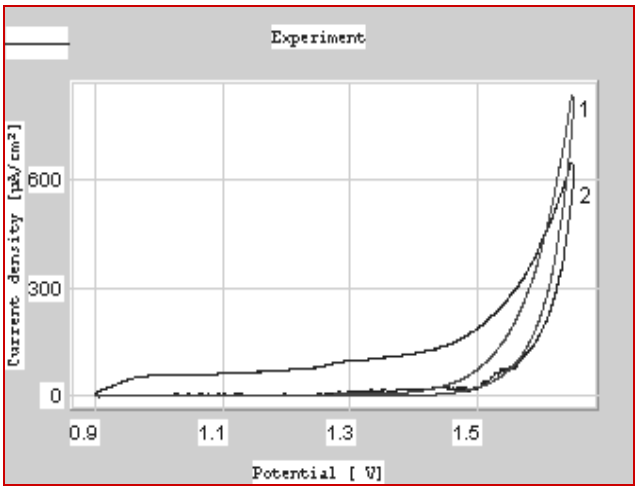

Fig.7. Sn determination in Maxim's (vegetables mix), E_{ESC} = 1.375 V

The values obtained using the electrochemical method are c = 3.60 ppm Sn for Conserv frig (I_{peak} = 0.1589 mA/cm^2) and c = 3.40 ppm Sn for Maxim's (I_{peak} = 0.1367 mA/cm^2). There are

obvious errors in using this method due to all the metal ions which can influence the electrochemical behavior.

CONCLUSIONS

The environment pollution with heavy metals (Cr, Ni, Pb, Zn, Al, As, Cd, etc.) is due mainly to the activity of humans. Two heavy metals (Sn and Al) showed higher concentrations then legally admitted in canned vegetables mix. Concentration of heavy metals from the polluted environment in vegetables is influenced by different factors and stopped through several mechanisms. The monitoring of heavy metals in canned vegetables mix can help to evaluate and improve the insufficiently developed technology.

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AUTHORS & AFFILIATION

[1.] I. DAVID[1], [2.] F. BERBENTEA, [3.] M. ŞTEFANUŢ, [4.] L. GEORGESCU, [5.] G.BUJANCĂ, [6.] T.TRAŞCĂ, [7.] M.DANCI[1], [8.] OANA DANCI

[1-2, 4-8] U.S.A.M.V.B., BANAT UNIVERSITY OF AGRICULTURAL SCIENCES AND VETERINARY MEDICINE,FACULTY OF FOOD PROCESSING TECHNOLOGIES, TIMISOARA, ROMANIA

[3.] NCEMC, NATIONAL RESEARCH-DEVELOPMENT INSTITUTE FOR ELECTROCHEMISTRY AND CONDENSED MATTER, TIMISOARA, ROMANIA

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[1.] CLAUDIU URSACHI, [2.] RODICA SEGAL , [3] CLAUDIA MURESAN

VACUUM IMPREGNATION PRETREATMENT OF FRESH CUT VEGETABLE

Abstract:
Vegetal products are generally characterized through a high level of sensitivity due to environmental factors and to the operations they are submitted to during their preparation. This leads to meaningful changes regarding vegetal products nutritional and sensorial characteristics. The prevention of such drawbacks can be made by introducing active compounds in their structure in order to protect them from unwanted alterations. The introduction of compounds can be achieved through classical infusion, through the immersion of the products in hypertonic solutions of the respective compound, or through a new technology, vacuum impregnation. In this paper, we present the data obtained during the experiments regarding impregnation whit some nutraceutical under a 500 mbarr vacuum of some vegetables, evaluated through physical and chemical proprieties.

Keywords:
vegetal products, environmental factors, pretreatment, fresh cut vegetable

INTRODUCTION

The increasing interest of people for the consumption of foods that have a beneficial effect on health has oriented both the research and the production in food industry towards the goal of obtaining such products[1]. Due to this fact, one of the main directions in the alimentary industry is focused upon the preservation of the existing natural compounds either through the minimum processing of the raw materials or through the strengthening of the foods with multiple physiologic active compounds such as prebiotics, probiotics, vitamins, fiber, mineral salts etc[2].
Another possibility to introduce the compounds in the structure of vegetable products, especially in the internal structure of fruit and vegetables, consists in the usage of a new technology, vacuum impregnation.

Vacuum impregnation consists in the immersion of vegetable products, characterized through high porosity (apple, quince, strawberries, apricots, peaches, peppers, mushrooms, etc), in solutions which contain dissolved substances meant to impregnate the product, followed by their storage in a place under a certain void pressure[3]. This technology can be applied in order to better the texture of the product to reduce its level of oxidation and its exudates at defrosting, to maintain its color, and to strengthen the different vegetable products with all kinds of nutrients: vitamin E[4], minerals salts like Ca and Zn[5], probiotics[6].
The aim of this paper is to use vacuum impregnation in order to introduce ascorbic acid into the structure of apples, so that the products become strengthened with vitamins and follow the vitamin's stability during the storage of apples in terms of refrigeration and defrosting[7]. We also took into account the need to prevent

the sliced apples to turn brown during this process, knowing their sensitivity towards oxidative factors on the one hand and the antioxidant properties of ascorbic acid[8] on the other hand.

THE STUDY

Materials and methods

Golden Delicious apple were purchased from a local store.

The following instrumentation has been used: installation for impregnation under void which consists in a RL-2 void pump and a vacuum-meter - manufactured by REFCO Manufacturing Ltd. from Switzerland- linked to a void exicator.

For impregnation we used a 0.5 per cent ascorbic acid (Fluka CH 9470 Buchs) solution.

The dosage of vitamin C was realized by iodomethric method[9], using solutions of potassium iodide 1 per cent and potassium iodate n/1000.

Experimental

The healthiest products have been chosen for the experiments, they were washed, their seeds and the seed home were removed with an stainless tubular knife and afterwards they were pealed off and cut in round shapes with the help of an stainless knife. The round circles had between 7 and 10 mm and a mass between 11 and 13.5 g. The samples were immersed in a solution in order to avoid their contact with the the air, apples sensitivity towards oxidation being a well known feature.

For impregnation we used a 0.5 per cent ascorbic acid solution.

For impregnation at atmospheric pressure, the apple slices were immersed within the solution. When the time expired, the apples have been removed from the ascorbic acid solution, they were put on a filter paper in order to obviate excessive water. One of the samples was used in order to dosage the vitamin C, while three other samples have been placed in glass containers and stored in the absence of light under refrigeration at 4 0C. Vitamin C has been dosed after three, six and nine days.

Two samples were kept under refrigeration at -180C. In this case, the dosage of vitamin C was done after 9 and 14 days.

For vacuum impregnation, the apple slices were immersed in the solution, introduced in the void exicator and maintained at a 500 mbarr vacuum pressure for 10 minutes. When the time expired, the apples have been removed from the solution; they were put on a filter paper in order to obviate excessive water. We calculated the quantity of impregnated solution and expressed it in percentage. A sample was used immediately for determination of vitamin C and three samples were placed in glass containers and stored in the absence of light under refrigeration at 4 0C. Vitamin C was dosed after three, six and nine days.

Two samples were stored in a freezer at -18^{0}C. In this case, the dosage of vitamin C was done after 9, and 14 days. The dosage of vitamin C was done using an iodomethric method. The method was chosen because it is simple and quick, it can be used for uncolored products, if we want to do some tests in order to obtain comparative results for products of the same species. The method is based on ascorbic acid oxidation with iodine produced through a reaction between potassium iodide and potassium iodate in an acid environment.

From an average sample made of examined material 10-20g is taken. The weighing are done using a analytical balance. The weighted material is grinded in a mortar with a bit of hydrochloric acid 2 per cent and 5 d of quartz sand, until a homogeneous paste is obtained. 40-50 ml dilution of hydrochloric acid 2 per cent is added and after a short mixing it is left to settle aut for e few minutes, then is filtered in a measuring bottle of 100 cm^3. The material remained in the mortar is washed 3-4 times with hydrochloric acid 2 per cent levigating and filtering the dilution and washing the measuring botlle. Thenceforth it is brought to the sign with hydrochloric acid 2 per cent and strongky stirred.

In an Erlenmayer of 100 cm^3, 10 cm^3 of the obtained extract is instilled, 30 cm^3 of distilled water, 5 cm^3 of potassium iodide 1 per cent and 5 cm^3 of starch glue 0,2 per cent as an indicator are added. It is titrated using potassium iodate n/1000 up to dark blue persistent 30 seconds.

The calculation results:

$$VitaminaC = \frac{V \times V_1 \times 0{,}088}{G \times V_2} \times 100$$

where: V - potassium iodate volume n/1000 for titrating [cm³];
V_1 - extract volume [cm³];
V_2 - semples volume [cm³];
G - weight of the analyzed sample [g];
Each measurement was taken in duplicate.

ANALISES, DISCUSION, APROACHES, INTERPRETATIONS

The results which were obtained after the dosage of ascorbic acid for the analyzed samples are listed in Table 1 and Table 2.

Table1. The content of vitamin C in the apples impregnated with a solution of ascorbic acid 0.5 per cent at atmospheric pressure and under vacuum after the preservation under refrigeration.

Nr. crt.	Sample	Vitamin C content [mg/100g product]			
		T_0	T_1	T_2	T_3
1.	Control	6,47	3,92	-	-
2.	Sample impregnated at atmospheric pressure and refrigeration	36,03	12,09	8,55	5,92
3.	Sample impregnated under vacuum and refrigeration	81,46	73,05	62,41	37,26

T_0 = immediately after impregnation,
T_1 = 3 days, T_2= 6 days =, T_3 = 9 days

Table 2 The content of vitamin C in the apples impregnated with a solution of ascorbic acid 0.5% at atmospheric pressure and under vacuum after the preservation under freezing.

Nr. crt.	Sample	Vitamin C content [mg/100g product]		
		T_0	T_4	T_5
1.	Sample impregnated at atmospheric pressure and freezing	37,29	31,42	30,45
2.	Sample impregnated under vacuum and freezing	79,84	72,96	72,47

T_0 = immediately after impregnation,
T_4 = 9 days, T_5 = 14 days

This study shows that by the vacuum impregnation of apples, Figure 1 (in certain work conditions) the content of ascorbic acid can be increased by 55% compared to the atmospheric pressure impregnation.
A reduction of ascorbic acid degradation has also been observed regarding the samples which had been impregnated under vacuum, compared to samples impregnated at atmospheric pressure, in the cases of preservation under refrigeration as well as the preservation in freezing conditions. Thus:

- *after 3 days the sample impregnated under vacuum reduced its content of vitamin C by only 10.32% while the sample impregnated at atmospheric pressure reduced its Vitamin C content with 33.5%;*
- *after 6 days the sample impregnated under vacuum reduced its content of vitamin C by only 23.38% while the sample impregnated at atmospheric pressure reduced its Vitamin C content with 76.27%;*
- *after 9 days the sample impregnated under vacuum reduced its content of vitamin C by 54.26% while the sample impregnated at atmospheric pressure reduced its Vitamin C content with 83.56%;*

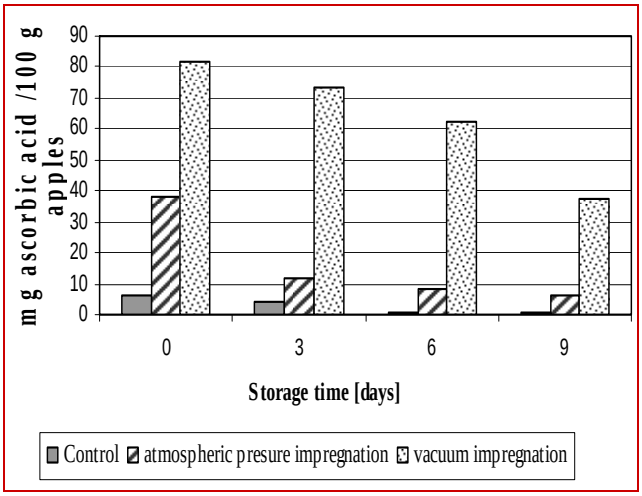

Fig. 1. Vitamin C content in fresh cut apples after refrigeration

The growth of ascorbic acid content and its higher stability can be explained by the fact that under vacuum impregnation the ascorbic acid penetrates into the plant tissue replacing the air (oxygen) from the apples porous structure.

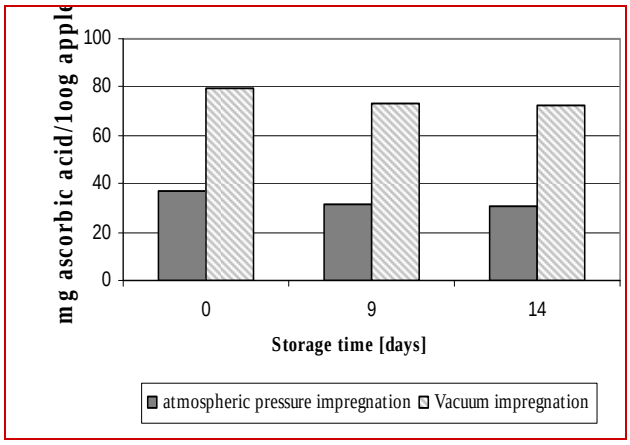

Fig. 2. Vitamin C content in fresh cut apples after freezing

By keeping products in frozen state, as was expected, the stability of vitamin C is higher (Figure2) than by preserving the products refrigerated. Nevertheless in this case the vacuum impregnation content of vitamin C was reduced by only 8.61% after 9 days and 9.22 after 14 days, in comparison to impregnation at atmospheric pressure where the reduction was of 15.7% after 9 days, respectively with 18.34 after 14 days.

CONCLUSION

Vacuum impregnation allows the ascorbic acid to incorporate itself in the structure of the apples in a much higher quantity than under atmospheric pressure. At the same time, vitamin C, impregnated under vacuum, has a greater stability in time due to the absence of oxygen.
Impregnation under vacuum thus presents a great potential of strengthening porous plants with other nutrients intended to improve their nutritional characteristics and also with compounds that can have a positive effect upon their physical or sensorial characteristics.
The sensorial evaluation of products impregnated under vacuum is particularly important in order to observe their degree of acceptance by consumers, task with which we shall continue these studies.

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AUTHORS & AFFILIATION

[1.] CLAUDIU URSACHI,
[2.] RODICA SEGAL ,
[3] CLAUDIA MURESAN

[1.,3.] DEPARTMENT OF TECHNICAL SCIENCE AND TECHNOLOGY, "AUREL VLAICU" UNIVERSITY OF ARAD,
[2.] FACULTY OF FOOD SCIENCE AND ENGINEERING , "DUNAREA DE JOS" UNIVERSITY OF GALATI, ROMANIA

ACTA TECHNICA CORVINIENSIS
BULLETIN OF ENGINEERING

[1.] VASILE BACRIA, [2.] NICOLAE HERIŞANU

ACOUSTICAL ARRANGEMENT OF THE URBAN ROADS

Abstract:
The phonic pollution on the urban roads is mainly generated by the transportation means. This affects the human being's live and activity. In this paper we presented the results obtained in the investigation and mitigation of the phonic pollution generated by the transportation means in the urban area through acoustical arrangement of the roads. Specific noise sources, characteristic levels, noxious effects, admissible limits and propagation way are identified. Description of measurements and analysis of the results are presented along with some methods concerning the decrease of the phonic pollution. The efficiency of the implementation of these methods is also discussed.

Keywords:
phonic pollution, decrease, urban roads, acoustic arrangement

INTRODUCTION

Noises and vibrations are generated on the urban roads by road transportation means such as trams, buses, trolleybuses, microbuses, cars, trucks, tractors or motorcycles. Sometimes, these noises and vibrations are generated also by the rail and air transportation means. This is possible when the urban roads are near the railway or the airport.
The noises and vibrations generated by transportation means have characteristic spectra and levels of intensity. In this way it is possible to identify the main noise sources from the road transportation means, specifying the noxious effects, admissible limits and propagation way.
Starting from the results of the measurements, we establish some methods concerning the phonic pollution reduction in the urban area through the acoustical arrangement of the roads.
The efficiency of the implementation of these methods was evaluated by new measurements. The acoustical arrangement can be applied in every practical situation concerning the urban roads.

NOISE SOURCES ON THE URBAN ROADS

The noise is generated on the urban roads by transportation means. This is characterized by specific frequency spectra, acoustic pressures and their variations in time. This noise depends on the intensity and composition of traffic, as well as on the speed of movement and it is generated by three basic sources: the engine, the exhaust system and the tire/road contact. The trams generate noise and vibrations due to the variation of speeds, the clearance of the rail extremity (joints), the elasticity of the rails, the conicalness, the eccentricity and the deformations of the bandages, the wheel guide on the rails and the brakes and accelerations.

NOXIOUS EFFECTS OF THE PHONIC POLLUTION

The phonic pollution generated by the road transportation means on the urban roads is extremely injurious for the human beings' life and activity. Thus, for the 70 dB(A) equivalent noise level during the daytime, 60% of the population on the urban roads is disturbed [8].
The phonic pollution affects human beings nervous system generating psycho-psychological and blood circulation modifications, as well as sleeps disturbances. Also the visual function and endocrine gland are adversely affected. At the same time the phonic pollution generates auditory tiredness and sonorous trauma.
In order to reduce the effects of the phonic pollution on the urban roads, limit values which cannot be exceeded are established. These limits are characterized by the equivalent noise level, by the noise curves (C_z) and by percentual noise level (L_{10}). The equivalent noise level corresponds to an equivalent intensity which could be constant during the whole considered period of time and it is defined by relation

$$L_{ech} = 10 \lg\left[\frac{1}{T}\int_0^T 10^{0,1L(t)}\,dt\right] \qquad (1)$$

where L(t) is the instant acoustic level.
The noise curves (C_z) define the relation between the characteristic frequency of a sound and the proper acoustic pressure level in the conditions of a subjective equivalent intensity.
In this way, Romanian standard STAS 10009-88 "Urban acoustics" established the admissible limits of the noise level in urban environment, differentiated on zones and functional endorsements. For the noise level on the urban roads these values are presented in table 1.

Table 1. The noise level on the urban roads

Street type (according to STAS 10144-80)	L_{eq} [dB]	C_z [dB]	L_{10} [dB]
I-main	75-85	70-80	85-95
II-linking	70	65	75
III-collecting	65	60	75
IV-local serving	60	55	70

In the same time the location of residential buildings on streets having different technical categories or at the limit of some functional areas as well as the road traffic organizing must be made so that to be assured the admissible limits for the exterior noise level (which is 50 dB or C_z45 curve). This noise level is measured in a point located at 2m distance from the building's wall, according to STAS 6161/1-79.
In order to limit the effects generated by rail traffic noise upon the urban environment, it is stipulated that this one cannot exceed 70 dB(A) at the limit of the rail area (or C_z65 curve).
For the limitation of the noise generated by the air traffic, it is recommended that this noise arising from airplanes displacement do not exceed 90 dB(A) during the daytime between 7.00-19.00 hours, 85 dB(A) during the evening between 19.00-22.00 hours and 80 dB(A) during the night between 22.00-7.00 hours.

PROPAGATION WAY OF THE NOISE

During the activity of different noise sources from the urban roads, rail or air transportation ways, their vibrations propagate in the surrounding environment as spherical and cylindrical waves and, at long distance, as plane waves.
The equation of spherical waves, in an elastic, homogeneous and isotropic medium with the speed potential Φ as a parameter is

$$\phi = \frac{A_c}{r} e^{j(\omega t - kr)} \qquad (2)$$

where r is the radial coordinate, A_c is the complex amplitude of the spherical wave at the frequency $f = \frac{\varpi}{2\pi}$ that travels from the source with the speed c and $k = \frac{\varpi}{c}$ is the wave number.
If we consider $A_c = Ae^{j\alpha}$, then the acoustical pressure can be determined with relation [3]

$$p = \rho_0 \omega \frac{A}{r} \sin(\omega t - kr + \alpha) \qquad (3)$$

In the same time, taking into account that some parts of the sources from the transportation means have cylindrical shape, because of their vibrations, there are produced cylindrical waves. The equation of cylindrical waves is

$$\phi = \left[AJ_m(kr) + jBY_m(kr)\right]e^{-jm\varphi}e^{-j\omega t} \qquad (4)$$

where ϕ has the known signification, r and φ are the cylindrical coordinates, A and B are constants, J_m is the Bessel function of the first degree and m range and Y_m is the Bessel-Neumann function of the second degree and m range.
In case of the waves that travel uniformly, then m = 0 and the acoustical pressure can be written

$$p = A\left[J_0(z) + jY_0(z)\right]e^{-j\omega t} \qquad (5)$$

Propagation of spherical, cylindrical and plane waves is causing the variation of the pressure in a point of the acoustical field. If we consider that a pressure at a specific moment is p, then the level of the acoustical pressure is

$$L = 20 \lg \frac{p}{p_0} \qquad (8)$$

where $p_0 = 2 \cdot 10^{-5}\left[N / m^2\right]$ is the reference acoustical pressure.

MEASUREMENTS ACCOMPLISHMENT

Taking into consideration the huge number and variety of sources that have a part to play in generating the noise on the urban roads, as well as the nature of the acoustic produced by these ones, the acoustic field is extremely complex and its study is indicated to be of an experimental nature.
Noise level measurements were carried out in 119 measurements points which were located near some of the most noisy roads crossings from Timişoara city [1], [5]. The measurements were performed using the Brüel & Kjaer 2237 Controller Integrating Sound Level Meter and the Hand-held Analyser Brüel & Kjaer 2250. These ones allowed measuring and automatic recording of the most important parameters of the noise such as: L_{eq} (equivalent noise level), L_{AE} (exposure level), L_{max} (maximum noise level),L_{min} (minimum noise level), $L_{0,1}$, L_5, L_{10}, L_{50}, L_{90}, L_{95} (percentage noise levels). These parameters were obtained during a continuous 8 hours period of time (7.30-15.30), divided into 1 hour time intervals.
By means of these measured parameters, it was possible to compute other physical indicators which characterize the effect of phonic pollution, such as:
- the noise climate

$$N.C. = L_{10} - L_{90} \qquad (7)$$

- the traffic noise index

$$T.N.I. = 4(L_{10} - L_{90}) + L_{90} - 30 \qquad (8)$$

- the level of phonic pollution

$$L.N.P. = L_{ech} + L_{10} - L_{90} \qquad (9)$$

In order to perform the measurements, the microphone was placed next to the urban roads border at 7,5 m distance from the axis of the first runway, at 1,30 m high from the ground.
Simultaneously with the noise data recording, the traffic composition and intensity as well as the speed of the vehicles were determined.
The results of the measurements, the intensity and composition of the traffic were centralized in a data base designed for the study of phonic pollution in Timişoara City.

ANALYSIS OF THE MEASUREMENTS RESULTS

From the obtained data it results that the equivalent noise level exceeds the maximum admissible value (defined by Romanian standard STAS 10009-88 concerning "Urban acoustics") in 95 points from the total of 119 measured points, which means 79,85% of the total points.
The overtaking was included into the interval 0,5-15,5 dB. Table 2 presents the statistical distribution of the equivalent noise level (L_{eq}) in the measured points, as well as the percentage of disturbed people [8].

Table 2. Statistical distribution of the equivalent noise level (L_{eq}) in the measured points, as well as the percentage of disturbed people

L_{eq}	No. of points	%	Percentage of disturbed people
54,3	1	0,85	8
55÷60	0	0	0
60,3÷63,5	9	7,6	25÷40
65,1÷70	37	31,1	42÷60
70,1÷74,9	51	42,8	60,1÷79,9
75,1÷79,6	18	15,1	80,1÷98
81,8	1	0,85	100
85,5÷85,9	2	1,7	100

In the majority of the measurement points, the peak noise level was exceeded with 1-9,5 dB while the admissible noise level established to 50 dB measured at 2 meters distance from the buildings was generally exceeded with 1,3-32,9 dB(A).
The average equivalent noise level for the 119 measured points was 71,03 dB(A) and the average traffic intensity was 1202,3 aut./h. The traffic intensity ranged between 9 and 2681 aut./h while the speed of vehicles ranged between 40 and 60 km/h.
The percentage of different transportation means is presented in table 3. The noise level generated by trains measured at the limit of the rail area exceeded the admissible value with 2,2-12,7 dB(A).

Table 3. The percentage of different transportation means

Transportation means	Minimum percentage	Maximum percentage
Trams	0,4	18
Buses	0,01	7,5
Trolleybuses	0,04	7,8
Microbuses	1,1	15,9
Cars	34,2	95,27
Trucks	0,3	18,1
Tractors	0,01	2,9
Motorcycles	0,01	4,1
Trains	0,08	54,7

Because in the majority of the measured points the admissible limits were exceeded, it was found to be necessary to apply some measures for acoustic arrangement of the urban roads.

ACOUSTICAL ARRANGEMENT OF THE URBAN ROADS

In order to reduce the noise on the roads in Timişoara City, some measures for acoustic arrangement were established and implemented. In this way, the old rail system was completely changed and replaced with a modern one, more silent, with better insulating properties. All the old noisy trams were replaced with a newer generation, but unfortunately not the newest one.
On many streets it was improved or replaced the superstructure of the runway. Many crossings were modernized and semaphores were installed. One-way traffic was imposed for some streets and the speed of vehicles was limited. It was eliminated the presence in traffic of heavy trucks in the central area of the City. On some roads it was allowed the access only for certain categories of vehicles. On the other side, in order to avoid the presence of heavy trucks on the urban roads, it was started the construction of a ring-road for Timişoara. Protective green zones were implanted between the runways and the residential areas.
The effect of the implementation of these measures on the noise abatement were evaluated through new measurements performed in 46 measurement points, selected near some of the most important crossings of the urban roads from Timişoara City.
From the obtained data it results that in the 46 measured points, the equivalent noise level was reduced with 0,1-12,4 dB and in 32 points (69,56%) the noise level does not exceed any more the admissible value defined by STAS 10009-88.
In the following section, we present a comparison between the situation existing in these 46 measurement points before and after the implementation of noise abatement measures.
In table 4 and table 5 we present the statistical distribution of the equivalent noise level and the percentage of disturbed people in those 46 measurement points before (table 4) and after (table 5) the implementation of noise abatement measures.

Table 4. The statistical distribution of the equivalent noise level and the percentage of disturbed people in those 46 measurement points before the implementation of noise abatement measures

L_{eq} [dB]	No. of points	%	Percentage of disturbed people
63,5	1	2,2	37
66,2÷69,7	10	21,7	47÷59
70,1÷74,9	28	60,9	60÷79
75,1÷78,6	7	15,2	80,1÷97

Table 5. The statistical distribution of the equivalent noise level and the percentage of disturbed people in those 46 measurement points after the implementation of noise abatement measures

L_{eq} [dB]	No. of points	%	Percentage of disturbed people
60,1÷65	16	38,4	25÷44
66,1÷69,9	18	39,1	47÷60
70,4÷74,2	11	23,9	61÷78
75,1	1	2,2	80,1

The average equivalent noise level in these 46 measurement points was 71,8 dB(A) for an average traffic intensity of 1260,7 aut./h before the application of noise abatement measures and 67,3 dB(A) for an average traffic intensity of 1429 aut./h after the implementation.
Regarding the average equivalent noise level existent at 2 meters distance from buildings, this one was 67,3 dB before the application of noise abatement measures and 62,7 dB after that.

Table 6. The transportation means before application of noise abatement measures

Transportation means	Minimum percentage	Maximum percentage
Trams	0,4	15,1
Buses	0,01	2,7
Trolleybuses	0,04	3,0
Microbuses	2,9	10,9
Cars	68,7	95,27
Trucks	0,4	16,4
Tractors	0,03	1,4
Motorcycles	0,01	1,7
Trains	0,1	1,7

Table 7. Transportation means after application of noise abatement measures

Transportation means	Minimum percentage	Maximum percentage
Trams	0,4	47,9
Buses	0,1	8,6
Trolleybuses	0,1	1,9
Microbuses	2,1	16,8
Cars	39,6	93,6
Trucks	0,1	15,3
Tractors	0,1	1,4
Motorcycles	0,3	10,4
Trains	0,1	1,5

The percentage of transportation means in these 46 measurement points is presented in table 6 (before application of noise abatement measures) and in table 7 (after application of noise abatement measures).
In the same time it was proved that an important contribution to the noise generated by the road transportation means on the urban roads has the tire/road contact, which can be reduced by covering the road superstructure with rubberized asphalt or with rubber pavement. Using these measures it is expected to obtain a noise level reduction with approximate 4 dB. These methods will be also useful for an increased traffic security realized through the elimination of the vehicle skidding.

CONCLUSIONS

After performing the investigations described in the paper, it was possible to evaluate the degree of phonic pollution for Timişoara City. The acoustical arrangement of the urban roads leads to a diminution of the pollution degree also a diminution of the percentage of disturbed people.
The measurements performed after the acoustical arrangement of the urban roads proved its efficiency. This can be underlined by comparing the results of the measurements performed before and after the acoustical arrangement of the urban roads.
Once the acoustical arrangement of the urban roads proved its efficiency, these methods can be easily applied in every practical situation concerning traffic or industrial noise.
Finally one can conclude that the acoustical arrangement of the roads implemented in Timişoara City proved its efficiency.

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AUTHORS & AFFILIATION

[1.] VASILE BACRIA,
[2.] NICOLAE HERIŞANU

[1. 2.] UNIVERSITY "POLITEHNICA" TIMISOARA, ROMANIA

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UNIVERSITY POLITEHNICA TIMISOARA
FACULTY OF ENGINEERING HUNEDOARA
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ACTA TECHNICA CORVINIENSIS
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NATALIA-CERNICA BUZGAU

GENERAL CONCEPTS OF MAINTENANCE

Abstract:
Maintenance involves preventive (planned) and unplanned actions carried out to retain a system at or restore it to an acceptable operating condition. Optimal maintenance policies aim to provide optimum system reliability and safety performance at the lowest possible maintenance costs. Proper maintenance techniques have been emphasized in recent years due to the fact that the safety and reliability requirements of system, increased complexity and costs of material and labor are increasing.

Keywords:
maintenance, reliability, Preventive maintenance (PM), Corrective Maintenance (CM), Imperfect maintenance

INTRODUCTION

Maintenance has evolved from simple model that deals with machinery breakdowns, to time-based preventive maintenance, to today's condition-based maintenance. It is of great importance to avoid the failure of a system during its actual operation especially, when such failure is dangerous or costly. Time-based and condition-based maintenance are two major approaches for maintenance. In contrast, condition based maintenance can be more profitable in order to avoid failure occurrence at the lowest cost and to improve the availability and reliability of the maintained system.
The choices of the inspection schedule and preventive maintenance thresholds obviously have a great influence on the economic performance of the maintenance policy. The inspection dates and the preventive maintenance are main decision variables considered in many researches.

MAINTENANCE CLASSIFICATION

Maintenance can be classified by two major categories: corrective and preventive. Corrective Maintenance (CM) is the maintenance that is performed when the system fails. Corrective maintenance means all actions performed as the result of failure, to restore an item to a specified condition.
Preventive maintenance (PM) is the maintenance that happens when the system is operating and it means all actions performed in an attempt to retain an item in specified condition by providing systematic inspections, detection, and prevention on failures. Maintenance can also be classified according to the degree to which the operating condition of an item is restored by maintenance in the following way [1]:

1. *Perfect repair: perfect maintenance is maintenance actions which restore a system operating condition to as „good as new". That is, perfect maintenance and a system*

has the same lifetime distribution and failure rate function as a new one. Generally, replacement of a failed system by a new one is a perfect repair.

2. *Minimal repair: minimal maintenance actions which restore a system to the same failure rate as it had when it failed. Minimal repair was first studied by Barlow [2]. The system operating state after the minimal repair is literally called „as bad as old".*
3. *Imperfect repair or imperfect maintenance: maintenance actions which do not make a system not „as good as new" but younger. Usually, it is assumed that imperfect*
4. *maintenance restores the system operating state to somewhere between „as good as new" and „as bad as old". Clearly, imperfect repair (maintenance) is a general repair (maintenance) which can include two extreme cases: minimal and perfect repairs (maintenance). Engine tune-up is an example of imperfect maintenance.*
5. *Worse repair or worse maintenance: maintenance actions which un-deliberately make the system failure rate or actual age increase but the system dose not breakdown. Thus, upon worse repairs a system operating condition became worse than that just prior to its failure.*
6. *Worst repair or worst maintenance: maintenance actions which un-deliberately make the system fail or break down.*

According to the above suggested classification, we can say that a PM can be a minimal, perfect, imperfect, worst or worse one. Similarly, a CM could be a minimal, perfect, imperfect, worst or worse CM. We will refer to imperfect CM and PM as imperfect maintenance later. The type and degree of maintenance used in practice depends on types of systems, their costs as well as reliability and safety requirements.

In the related literature, most studies assume that the system after CM or PM is „as good as new" (perfect maintenance) or „as bad as old" (minimal maintenance). In practice, the perfect maintenance assumption may be acceptable for system with one component which is structurally simple. On the other hand, the minimal repair assumption seems reasonable for failure behavior of systems when one of its components, non-dominating component, is replaced by a new one. However, many maintenance activities may not result in these two extreme situations but in a complicated intermediate one. Therefore, perfect maintenance and minimal maintenance are not practical in many actual instances and realistic imperfect maintenance should be modeled.

Recently, imperfect CM and PM have received more attention in reliability and maintenance literature. In fact, we can say that imperfect maintenance study indicates a significant breakthrough in maintenance and reliability and maintenance theory. In [3] the author mentioned that imperfectness of maintenance is related to the skill of the maintenance personnel, the quality of the maintenance procedure, and the maintainability of the system [3]. Obviously, maintenance expenditure and reliability requirement also have important effects on imperfectness of maintenance. Barlow and Proschan presented some possible causes for imperfect, worse or worst maintenance due to the maintenance performer [4]:

- *Repairing the wrong part.*
- *Only partially repairing the faulty part.*
- *Repairing (partially or completely) the faulty part.*
- *Incorrectly assessing the condition of the inspected units.*
- *Performing the maintenance action not when called for but at customer convenience.*
- *Nakagawa mentions three reasons causing worse or worst maintenance [5]:*
- *Hidden faults and failure which are not detected during maintenance.*
- *Human errors such as wrong adjustments and further damage done during maintenance.*
- *Replacement with faulty parts.*

According to Barlow and Proschan [4], maintenance policies based on planned inspections are „periodic inspection" and „inspection interval dependent on age". By periodic inspections, a failed unit is identified or it is determined whether the unit is functioning or not. With aging of the unit, the inspection interval may be shorter. These inspection methods are subject to imperfect maintenance caused by randomness in the actual time of inspection, in spite of the schedule, imperfect inspection and cost structure. Therefore, realistic and valid maintenance models must incorporate with random features of the inspection policy. So far only a small portion of literature

concerning to the stochastic behavior of the repairable systems and maintenance is involved in imperfect maintenance.

MULTI COMPONENT SYSTEM'S MAINTENANCE

Currently, the interest for multi component maintenance models is increasing. In the beginning vast majority of the maintenance models were concerned about a single piece of equipment operating in a fixed environment, considered as an intrinsic barrier for allocations. Maintenance action of a multi component system differs from that one for a single-unit system; because these depend on some factors. One of the dependencies is economic dependence. Another one is failure dependence, or correlated failures. Economy dependency is a common term in most continuous operating systems. For this type of systems, the cost of system unavailability (one-time shut-down) may be much higher than component maintenance costs. Therefore, there is often great potential cost saving by implementing an opportunistic maintenance policy.

Obviously, the joint maintenance of two or more subsystems tends to spend less money and less time (economy dependency), and the failures of different subsystems in multicomponent system may not be independent (failure dependency). Thus, each subsystem may not be considered as a single-unit system, and to apply the existing optimum maintenance models of a single-unit system to each of such subsystems may not be practical.

Imperfect maintenance exists also in a repairable multi-component system. If one of its subsystems fails, it can be repaired by replacing some of its parts. Clearly, reliability measures of the repaired subsystems are improved after repair but it might not be as good as new (imperfect CM), and consequently the entire system will no longer function as well as a new one.

Realistic imperfect maintenance associated with individual subsystems and accordingly systems have to be modeled. According to [6], systems used in the production of goods and delivery of services constitute the vast majority of most industry's capital. These systems are subject to deterioration with usage and age. System deterioration is often in higher production costs and lower product quality, to keep production costs down while maintaining good quality. PM is often performed on such systems. It is obvious that these kinds of system are often composed by many subsystems whose maintenance is often imperfect or sometimes even worse. It is necessary to point out that considering the entire system as a single unit by a minimal repair model may not be suitable for large-scale systems. Such maintenance modeling is also too rough for complex systems due to the economy and failure dependencies. In practice, some subsystems are inspected and tested separately and their reliability performances are also evaluated individually.

Lifetime distributions of all new subsystems are known through reliability tests and statistical results before they will be used for such systems. As a result, we can evaluate whole system reliability measure and system maintenance cost based on failure information, maintenance costs, and maintenance degree of all subsystems. Therefore, we may say that a realistic method is to treat a system the same as one with many subsystems which are subjects to imperfect maintenance. We are, also able to model imperfect maintenance of the system through imperfect maintenance modeling of all subsystems and at the same time economical model and failure dependency of the system in order to obtain global optimum maintenance policies for the system.

CONCLUSION

The usual criteria of optimization of maintenance policies are based on maintenance cost measures, same as expected maintenance costs per unit of time and total discounted costs. Hence the optimal maintenance policies are the ones that minimize or maximize a given cost criterion

Reliability is the branch of quality assurance that deals specifically with the ability function upon demand. During the last decades many works have been devoted to the binary-state reliability analysis, where it is assumed that a system may experience only two possible states: one working state and one failure state.

However, in many real world situations a system or a component could experience more than two levels of performance varying from perfect functionality to complete failure; these systems are called multi-state systems. The evaluation of

maintenance, testing, and repair policies becomes more and more complex for multi-state systems that contain combinations of revealed and unrevealed failure [7].

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AUTHOR & AFFILIATION

NATALIA-CERNICA BUZGAU

S.C. REVA S.A. SIMERIA, ROMANIA

ACTA TECHNICA CORVINIENSIS
BULLETIN OF ENGINEERING

[1.] TIBERIU ŞTEFAN MĂNESCU, [2.] ION SIMION,
[3.] NICUSOR LAURENTIU ZAHARIA

WITH SPIDER8 ON RAILS

Abstract:
The carrying of heavy trains on large inclines can produce the breaking of the draw hook. The railway freight operator, want to carry long trains because of the economic reasons. This paper will present the steps of tests performing in purpose to measure the tensile forces from the locomotive draw hook equipped with strain gages. The purpose of the tests was increasing the tonnage of the trains on the inclines (the tonnage of the trains on the inclines is restricted by railway regulations).

Keywords:
Hottinger, Spider8, Catman, strain gauges

INTRODUCTION

Circulation on Romanian Railways is done under regulations in purpose to ensure optimal conditions of safety for passenger and freight trains.
From the point of view of passenger options there are alternatives at trains (cars, buses etc.), but regarding the freight transport there are some products which it will be always carry by the trains (cereals, oil, coal etc.).
If the freight trains run on plate ground, there aren't any problems if there is even one electrical locomotive of 5100 kW power. But, if the train run on inclines (which in Romania can have the value of 25‰) then a second locomotive it is necessary depending of the total length of train or his weight.
Romanian railways freight operators from Romania have electrical locomotives on four or six axles. If they use more than one locomotive at one train on the inclines the solve the problem of additional needed power, but another question appears: will the locomotive hook break it?
In purpose to measure the forces which appear in the drawing hook, one of the methods which can be used is applying strain gauges on the hook and measuring of the strains during the train's circulation.

MEASUREMENT POINTS, DEVICES AND TESTS

The measurements were performed with Hottinger Spider8 device connected to a laptop. The acquisition software used was Catman 4.5 also from Hottinger.

For simple loads (tensile/compression for example) it is necessary to glue strain gauges like those presented in figure 1.a.

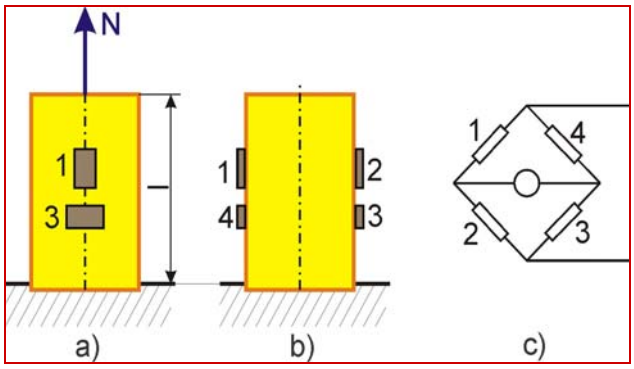

Figure 1 Tensile/compression loads transducer

Because any transducer is sensitive to different types of loads in the same time, the strain gauge glued on it, measure a strain witch represents the algebraic sum of the strains for each load type. The separation for each load type can be done if are glued more strain gauges.
In the tensile load, principal strain 1 is parallel with the longitudinal axe of the elastic element and principal strain 2 is perpendicular on principal strain 1.
The coupling hook it is an assembly of many articulated components. The thread axe where the strain gages were glued is load only with tensile forces.
A full Wheatstone bridge was used for measuring the tensile forces from the drawing hook of the locomotive (figure 1.b and figure 1.c.). The strain gauges were connected to Hottinger Spider8 measuring device.
In fig. 2 is shown the drawing hook of the locomotive which has strain gauges glued on it.
The drawing hook was mounted the second locomotive and the first wagon of the train.
The measuring of tensile forces was performed in two variants of locomotive coupling:

(EA+EC and EC+EC),

where EA is electrical locomotive with six axles, 5100 kW power and EC is electrical locomotive with four axles, 3400 kW power.

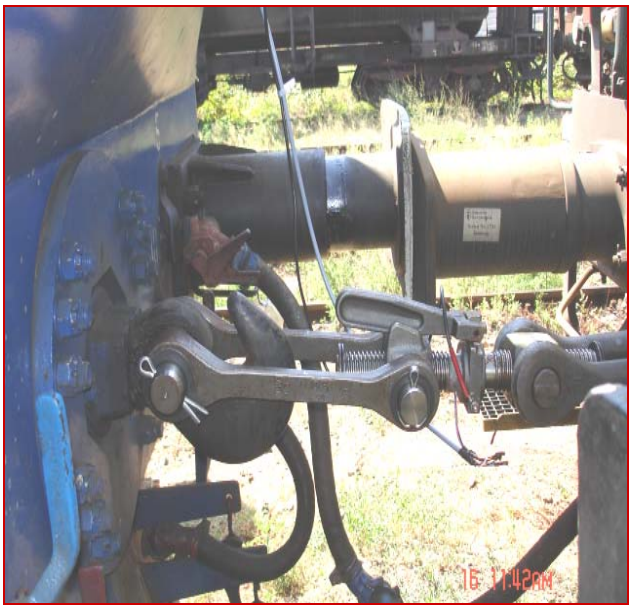

Figure 2 Drawing hook with strain gauges

The tests was done between railway stations Drobeta Turnu Severin – Şimian – Balota – Prunişor (Balota is the highest point of an incline with the maximum value of 29‰).
The performed tests were:

- *Between railway stations Şimian and Balota the locomotives were coupled EA+EC, the train weight was 1218t;*
- *Between railway stations Drobeta Turnu Severin and Balota the locomotives were coupled EC+EC, the train weight was 1218t;*

Between railway stations Prunişor and Balota the locomotives were coupled EA+EC, the train weight was 2960t.

RESULTS

The maximum values of measured tensile forces are presented in table 1.

Table 1. The maximum values of measured tensile forces

Between	Force [kN]
Şimian – Balota	470,2
Dr. Tr. Severin – Balota	384,8
Prunişor – Balota	457,6

The graphic representation of the tensile forces it is shown in fig. 3÷5.

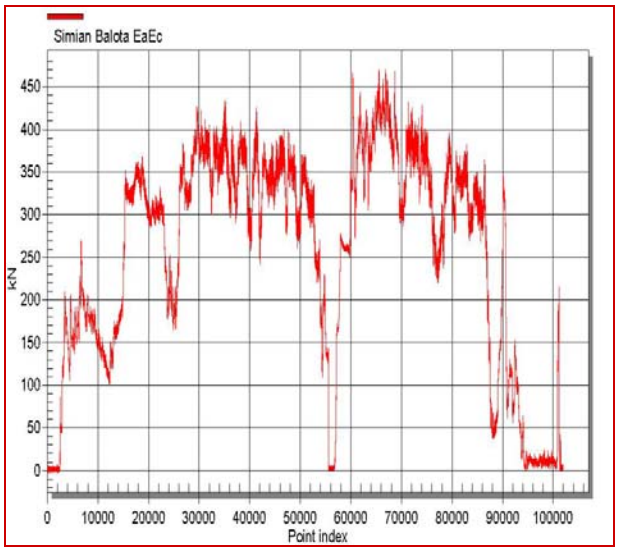

Figure 3 Locomotive coupled EA+EC

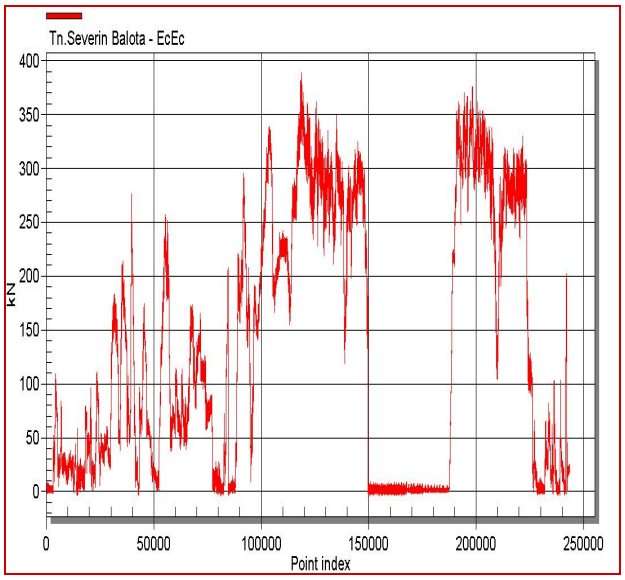

Figure 4 Locomotive coupled EC+EC

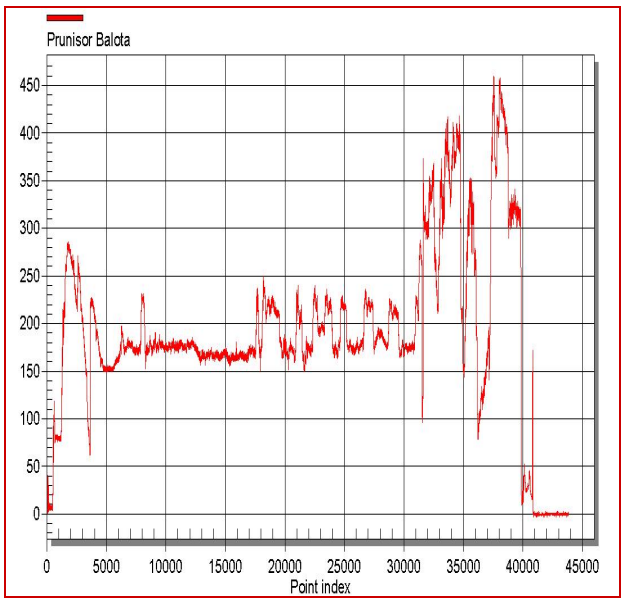

Figure 5 Locomotive coupled EA+EC

CONCLUSION

The results obtained after the finishing the tests can be used to adjust the weight of the train by increasing the weight of those but only if the technical condition of the locomotives is optimal especially from the point of view of weight balance on axle and good maintenance of the sanders.
In all cases which was study during those tests it was prove that when two locomotives are used is better that first to be an EC type locomotive

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AUTHORS & AFFILIATION

[1.] TIBERIU ŞTEFAN MĂNESCU,
[2.] ION SIMION,
[3.] NICUSOR LAURENŢIU ZAHARIA

[1.] UNIVERSITY "EFTIMIE MURGU", REŞIŢA, ROMÂNIA
[2,3.] ROMANIAN RAILWAY AUTHORITY – AFER, BUCUREŞTI, ROMÂNIA

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ACTA TECHNICA CORVINIENSIS
BULLETIN OF ENGINEERING

[1.] MARIUS CĂLIN BENEA

NEW DEVELOPMENTS IN THE RELATIONSHIP SELLING APPROACH

Abstract:
The traditional selling approach has suffered tremendous changes lately related to a major shift in the way the sales force is approaching the existent and potential customers. The new developments can be classified into many categories, but we would like it concentrate on few major developments that would dramatically impact the way sales force is evaluating the sales approach. We can classify these developments into 2 major categories: technology and conceptual. In the current context, we would like to analyze the specific changes in each category and a better understanding of the specific characteristics related to each category.

Keywords:
Relationship, selling approach, customer, buyer

DEMANDING CUSTOMERS – FIERCE COMPETITION – BREATHTAKING TECHNOLOGICAL INNOVATION...

These are the realities of today's global marketplace... realities that have changed forever the way we do business, especially the way we sell. Gone are the days when salespeople could rely on charming small-talk and aggressive closing techniques alone to generate business.
Many traditional selling approaches regard selling as something the seller does to the buyer. They sell them something. The result of this attitude to sales is that many salespeople adapt a manipulative, almost coercive style of selling. Some salespeople think of selling as pushing a customer into buying, and success as a victory. Often, people fear salespeople and distrust them. They think of salespeople as fast talking and slick. They are wary of being sold something they really don't need or want.
The traditional customer call once seemed indispensable to the selling process; the time and expense involved were just a basic cost of doing business. In recent years, however, the business community has come to regard the sales call as an expenditure for which there are substitutes. For many companies telemarketing and direct mail have made the sales call a choice not inevitability. This is not surprising when various studies suggest that getting one sales person in front of one customer now costs triple since 1983. As a consequence professional salespeople have to be more effective than ever to justify the investment in a face to face effort.
In essence, we can draw a number of primary conclusions and taken together, these findings paint a picture of the current state of the sales environment.

CUSTOMER FOCUS CREATES COMPETITIVE ADVANTAGE

Customer focus creates competitive advantage are:

- *The one term that sets top performers apart - customer focus*
- *Outstanding sales results depend on:*
  - *The ability to think from the customer's point of view*
  - *Understanding the customer's agenda, buying cycle and best interests*
- *Beyond a superficial reading of immediate customer needs, salespeople must gain a deeper understanding of both the buyer's long-term goals and the overall business climate*
- *At the heart of customer focus is the art of listening constructively - the best salespeople are masters at capturing information*
- *Customer focus means taking the customer seriously - to-day the salesperson who clings to the product orientation of a decade ago is losing ground*

As client companies branch into new markets and unfamiliar territories, they are demanding unique, flexible solutions from their vendors - customized to support specific goals.

Another myth which can be exploded is that whilst customers value flexibility, being too flexible can undermine the sales relationship. On the whole salespeople imagine that customers value a vendor's responsiveness above all. However recent research shows that their primary concern is reliability.

In summary, in order to maintain customer focus the best salespeople become facilitators, creating a partnership that extends the selling relationship within the customer's company. The motivation to achieve this should be strong - it costs five times as much to attract and sell to a new customer as it does to an existing one!

THE RIGHT TO DO BUSINESS HAS TO BE EARNED AND NEVER ASSUMED

Rather than doggedly asking for the business, the very best sales people work to keep the relationship moving towards a sale. They realize the need to identify how to turn their company's products into real solutions, which must meet specific needs.

Unfortunately, our surveys confirm that the average salesperson drags the customer over old ground as much as 52% of the time - they are unable to provide continuous stimulation and never know when to treat an existing customer like a new one.

Conversely, exceptional salespeople only make such 'return' calls for 10% of the time. Above all, earning the right to proceed requires gaining the customer's trust and top salespeople work diligently to establish a climate in which the customer is willing to share information and feels comfortable doing so. The key here is integrity.

CUSTOMERS ARE PERSUADED WHEN THEY ARE PART OF THE PROCESS AND NOT PART OF THE AUDIENCE

Sales success to-day demands a radical shift from the 'peddler' mentality of merely demonstrating products and expanding on their features. It requires treating the customer as a participant. More often than not, a 'flashy' sales presentation alone alienates rather than persuades

The best salespeople regard the sales call as a two-way conversation - not a one sided pitch. They have developed active listening skills. Average salespeople score fairly well in their ability to provide customers with facts and figures, but top performers dramatically outscore the rest when it comes to gathering information.

In addition, how a salesperson collects information still distinguishes exceptional achievers from the rest of the pack. I.e. top performers ask better questions and as a result gain much better information. Essentially, they aim to engage customers in the buying process with questions that require thoughtful answers, that stimulate curiosity and that reveal the customers underlying needs.

BUSINESSES NEED TO RE-DEFINE SELLING AND WHAT CONSTITUTES BASIC SELLING SKILLS

In to-day's world of selling, there is less and less room for apprenticeship. Selling has become an exclusive club of highly skilled professionals where product knowledge and time management skills, for instance, are the cost of membership not leadership.

Ongoing research demonstrates that to-day's 'average' salesperson is just as effective as the high performer in explaining features and benefits effectively, relating a service or product to customer needs and closing a sale. But, above this Level 1 plateau of competence, the exceptional salesperson is busy defining the "basic skills of tomorrow".
Building an up-to-date foundation in sales competence does mean sacrificing some old notions of what it takes to succeed in a competitive marketplace. For example, a salesperson can no longer just "win by knowing". Every company needs to test their assumptions about what skills really contribute to sales success. Too often operating on old sales theories means training and rewarding people to do the wrong things.

When The Buyer And Seller Act As Partners, They Are Building A Bridge To Profitability

Successful selling is definitely not about the "hit and run" sale. Sales achievers regard their relationships with key customers as a partnership and cultivate it as such. When customers face tough business challenges and complex technological choice, they rely on sales people who can assist them in making the right decisions.
The primary objective of a sales partnership has to be, to create and sustain a mutually productive relationship, which serves the needs of both parties, now and in the future. The key word here is symbiotic. Partnership does not mean eliminating the tension between buyer and seller; it means that top-performing salespeople know how to strike a balance between achieving immediate results and developing the relationship fully.

In Summary: Why Do We Need A Fresh Approach To Selling?

Many organisations have developed without objective analysis of their purpose and structure. The buying power in many industries is no longer evenly distributed - in a large number of markets a few big firms control the majority of purchases.

The development of new marketing techniques has meant that some tasks traditionally performed by the sales team can be more effectively handled by other methods. The prime objective of all sales staff is to gain business. From an organisational point of view, however, how they all achieve their goals must be defined in order to identify what kind and the quality of skills that are required.
Develop a long term relationship by attaining customer satisfaction Truly effective salespeople succeed because they are genuinely curious and concerned about people in general - and customers in particular. Their desire to understand the customer takes priority over their desire to sell their products and services. The delightful irony, of course, is that the very reason they are successful at selling is because they have made their desire to sell a secondary issue. The primary issue is the relationship they have with their customer.
The surest way to cement a long term business relationship with your customer is to remember that no sale is completed until the customers expectations have been met or, preferably, exceeded. There are many salespeople who take customers for granted. The excitement of new sales often leads to ignoring existing customers. The result is constant pressure to create new business from scratch. Meanwhile, some of your best prospects are right there under your nose, in your own customer base.
The "traditional", fast-talking slick sales person is no longer effective in today's global marketplace. Dynamic and highly competitive, our market consists of well educated, savvy consumers looking to the modern salesperson for guidance in making well-informed buying decisions. Those unwilling or unable to adapt not only experience declining sales, but also risk severing long-term customer relationships. The challenge is enormous and the stakes are high.
Customers buy for their reasons, not ours. When we strive to form a partnership with our customers, providing them with valuable help and advice as well as supplying vital products and services, we virtually ensure sales success.

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AUTHORS & AFFILIATION

MARIUS CĂLIN BENEA

DEPARTMENT OF ENGINEERING & MANAGEMENT,
FACULTY OF ENGINEERING HUNEDOARA,
UNIVERSITY "POLITEHNICA" TIMISOARA, ROMANIA

ACTA TECHNICA CORVINIENSIS
BULLETIN OF ENGINEERING

[1.] IMRE KISS, [2.] STEFAN MAKSAY, [3.] VASILE ALEXA

THE CAST IRON ROLLING ROLLS MANUFACTURING – BETWEEN THE MATHEMATICAL APPROACHES AND THE OPTIMISATION OF PROCESSES

Abstract:
The irons destined to these cast rolls belong to the class of low-alloyed irons, with reduced content of chrome, nickel and molybdenum. The technological instructions firmly state the elements required raising the quality of rolls, but the limits can be extensive or limited. Depending on the number of the technological parameters, it was chosen the analysis of multiple regressions studying the influence of the chemical composition upon the hardness, through the mathematical modeling.
The technical conditions, which are imposed to the cast iron rolls in the exploitation period, are very different and often contradictory. The obtaining of various physical and mechanical properties in the different points of the rolls meets difficult technological problems in the industrial condition. This supposes us to know many technological factors, which lead to the exploitation of this deformation equipment.
The experimented researches, as well as the optimization of the manufacturing technology, allow the conclusion of direct results for the rolls. The beneficiaries of these results are the unit in which the rolls are manufactured, as well as the unit that exploits them.

Keywords:
cast iron rolls, alloying elements, mathematical interpretations

INTRODUCTION

Poverty of detailed researches, theoretical and experimental, about the thermo-mechanical processes take place during the plastic deformations between the rolling mills rolls, represents a factor that reduces the possibility of rational exploitation of rolling mills. In the context of market economy is necessary a new evolution in the area of scientific researches, in the purpose of modernization of the equipments and metallurgical plants, using the most efficient solutions for obtaining aggregates with performances to the level of world technique. The technological processes of the rolls manufacture, as well as the quality of used materials have a quick extension, materialized in worldwide market competition, through exceptional qualities of rolls.
The technological manufacturing process of the rolling mills rolls, as well as the quality of material used in manufacturing them, can have a different influence upon the quality and the safety in the exploitation. Our proposal approaches the issue of quality assurance of the rolling mills rolls, from the viewpoint of the quality of materials, which feature can cause duration and safety in exploitation.
In these sense, our researches propose, on aside, to analyze the technological field of the rolling rolls manufacturing process – analysis materialized from prism of the foundry

experiments, including the metallurgical and mechanical aspects (casting process, moulding, iron melting, nodularization of graphite, hardness, durability and so others), and on another side, the optimization of the manufacturing technology of the cast rolls, especially those from cast-iron – using electronic calculus technique as the molding phenomenon and mathematical interpretation of the technological processes.

The research on rolling mills rolls quality experimentally and teoretically defines an important chapter from the metallurgical, mechanical and mathematical aspects of these machines organs in the movement of rotation, in variable temperature mediums. Also, the mathematical modeling establishes a methodology for the determination of the technological parameters values, for which a mechanical characteristic (the hardness) has the desirable values. Because is disposed of real data, the optimization model is based on industrial data, obtained from cast-iron rolling rolls. Their analysis shall lead to the optimization pattern, through the prism of the multicomponent correlations, enounced by mathematical formulae.

Starting from the principle of molding process, used as necessary basic instrument, both in phase of conception, as well as in the industrial technologies analysis, is determined the optimum regimes of the cast rolls, from the view from chemical composition, as one as the most important parameters of disturbance of the manufacturing process. The enunciation of some mathematically molding results, described through a number of multicomponent equations determined for the spaces with 3 the and 4 dimensions, as well as the generation of some regression surfaces, of some curves of levels, of the volumes of variation, of the lines of outlines of the volumes of variation of surfaces and the areas of variation of these, can be represented and interpreted by technologists and can be considerate diagrams of correlation between the analyzed variables. From this point of view the project is inscribes in context of scientific capitalization of the process and the industrial technologies optimizations, on the way of the analysis and the mathematical experiment.

THE TECHNOLOGICAL APPROACHES

The nodular graphite cast iron is considered as one of the most versatile roll materials nowadays. This type of material may be used to produce large scale rolls in double pouring process, the barrel of rolls has high hardness while the neck has high toughness, so this type of rolls exhibits the properties of high thermal stability and resistance to wear. As the characteristics of any casting are influenced by the microstructure that is formed during the solidification in the cast form, and under the influence of the cooling speed, the main criteria, which determines the mechanical properties of the rolls is the structure. All structural components can be found in cast iron rolls, each of the components having its own well-determined hardness. One of the parameters, which are determined the structure of the irons destined for rolls casting, is the chemical composition. If we do not respect this composition, which are guarantied by the exploitation properties of the each roll in the stand of rolling mill, this leads to rejection. All FNS type rolls are alloyed especially with chrome, nickel and molybdenum, in different percentages. The irons destined to these cast rolls belong to the class of low-alloyed irons, with reduced content of these elements. The technological instructions firmly state the elements required to raise the quality of rolls.

The recommended hardness's for the working surfaces of the half-hard rolls are presented in Table 1, according with the hardness classes adopted by the Romanian Standard Regulations. Also, the recommended hardness for the rolls necks and the core are presented in same Table 1. The usual chemical composition of the irons destined for casting the half-hard rolls is presented in Table 2.

The quality of rolls is determined through hardness and through wear resistance, last index having a special importance for all modern rolling mills with a growth production. Of major importance for the rolls exploitation is not merely growth resistance, but also the ability to oppose to different types of wear. Thus, rolling mill rolls considerable influence the specific production and the qualitative level of laminates, reason for which they are given a special attention, in manufacturing, as well as in

usage. These requirements can't be completely fulfilled, compelling to the granting of priorities depending on the type of laminates, therefore to compromises. At large, the problem is reduced to the correct material choice, eased by the rich available experience in the current conditions of manufactured and burdened, in the same time, by the large diversity of material used.

TABLE 1. The recommended hardness's of the half-hard rolls for the rolls working surfaces (body), the necks and the core

Rolls Type	Hardness Classes	Hardness			
		on the rolls working surface		on the necks and in the core	
		[HS]	[HB]	[HS]	[HB]
FNS	0	33… 42	218… 286	30… 40	195… 271
FNS	1	43… 59	294… 347	30… 40	195… 271
FNS	2	69… 75	499… 550	35… 45	218… 309

TABLE 2. The usual chemical composition of the irons destined for casting the half-hard rolls

Rolls Type	Chemical Composition, [%]				
	C	Si	Mn	P	S
FNS	3,0.. 3,5	1,2.. 2,5	0,1.. 0,7	max. 0,15	max. 0,02
Rolls Type	Chemical Composition, [%]				
	Ni	Cr	Mo	Mg	
FNS	1,5.. 2,5	max. 0,8	0,3… 0,5	0,02… 0,04	

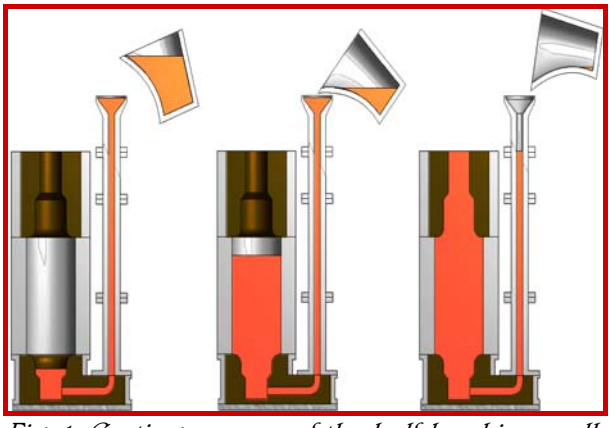

Fig. 1. Casting process of the half-hard iron rolls

Although the manufacture of rolls is in continuously perfecting, the requirements for superior quality rolls are not yet completely satisfied, in many cases, the absence of quality rolls preventing the realization of quality laminates or the realization of productivities of which rolling mills are capable.

To the selection of materials is considered the type of rolling mill, the sizes of rolls (in specially this diameter), the speeds of lamination, the stands from the train of lamination for which is achieved rolls, the working temperature in the lamination process, the module of cooling during work, the size caliber, the pressure on rolls, the rolled material hardness, etc.

The choice of material for rolls is the operation which takes into consideration the own solicitations of the lamination process afferent to the type of laminates (semiproduct or the finite laminate), and the features of different materials considerate optimum in the fabrication of different typo-dimensions of rolls.

Having abrading and dry friction wear resistance, as well as another mechanical characteristic superior to cast irons with lamellar graphite, the cast-irons with nodular graphite are successfully used to the cast of types of rolls. The main structural constituent of the cast-iron is the graphite, of the amount, form, sizes and module of allocation in basic metallic mass depends the physical and mechanical property of the cast-iron, inclusively of the rolls, as well as the wear resistance. For this reason, the amount and the module of distribution of the graphite separation in working surface of rolls it can be considered as main criterion of classification. The presents of graphite in working surface (body of rolls) assures the friction coefficient necessary to obtain quality laminate. From this point of view, the cast irons with nodular graphite is used to manufacture large types of rolls.

Having in view the complex solicitations in exploitation, another important characteristic imposed to the rolling mills rolls is the thermal shock resistance. The main cause of wear is the appearance of fissures on the working surface, due to thermal fatigue. The thermal wear, in principle, can be explained through the different behavior of the constituents that compose the basic metallic mass, in variations of temperature. The thermo-mechanical wear, due the crossing among the rolls of the laminates, warmed in the austenitic area, is direct influenced by the fineness of the basic metallic mass structure, as well as the form and size of graphite disjunctions. In order to obtained a good durability, it is needed a fine homogeneous structure, with a great degree of dispersion of the pearlite.

THE MATHEMATICAL APPROACH

The statistical methods of the analysis do not solve a whole series of appearances regarding to the decisions model to establish the management of the process. For this reason, in parallel with the statistical methods, was developed the methods of optimization.

As part as the basic experiment, through the regression analysis, it was aimed the determination of the mathematical functions form which connect the dependent variables u of the technological process with the free variables (the technological parameters) x, y, z,…, meaning u = f(x, y, z,…), on the strength of some experimental determinations, this after it accomplished a dispersion analysis of these correlation data. The determination of what real coefficients enter into the expression u = f (x, y, z,…) is done, in the vast majority of the cases, through the method of the smallest squares.

Depending on the number of free variables (the technological parameters) that we consider, it was chosen the analysis of multiple regressions studying the influence of free variables x, y, z,… upon the dependent variable u. In this sense, it was aimed to establish calculus methodologies of values for the technological parameters in the manufacturing process of the semihard rolling mill rolls, obtained through the simplex classical cast of the iron with nodular graphite, for which the mechanical features of rolling mill rolls have the required values.

Having "n" experimental points, respectively $(x_1, y_1, u_1)_1$, $(x_1, y_1, u_1)_2$, …. $(x_1, y_1, u_1)_n$, we need to determine the real coefficients c_0, c_1 and c_2 in the equation of the plan. This is accomplished through the method of the smallest squares, which leads to finding them through the following system of three equations with three unknown variables (a_0, a_1, a_2):

$$\begin{cases} n\cdot c_0+\left(\sum_{i=1}^{n}(x)_i\right)\cdot c_1+\left(\sum_{i=1}^{n}(y)_i\right)\cdot c_2=\sum_{i=1}^{n}u_i \\ \left(\sum_{i=1}^{n}(x)_i\right)\cdot a_0+\left(\sum_{i=1}^{n}(x)_i^2\right)\cdot a_1+\left(\sum_{i=1}^{n}(x)_i\cdot(y)_i\right)\cdot a_2=\sum_{i=1}^{n}(x)_i\cdot u_i \\ \left(\sum_{i=1}^{n}(y)_i\right)\cdot a_0+\left(\sum_{i=1}^{n}(x)_i\cdot(y)_i\right)\cdot a_1+\left(\sum_{i=1}^{n}(y)_i^2\right)\cdot a_2=\sum_{i=1}^{n}(y)_i^2\cdot u_i \end{cases} \quad (1)$$

where the real coefficients (the sums from parentheses) are calculated tabularly. The solution of the system is done through the Cramer rule, using the determinants of the system.

Departing from the experimental results, in a first phase the stage are determined the mathematical models of dependencies for optimized parameters (the mechanical features the materials) with the technological parameters in the influences of the process, in the form of equation (2). In mathematical model it is reduced to complex mathematical processing of dependences in the features analyzed depending on two or three chemical elements, grouped depending on the influence upon them. Thus we can analyze dependences type (3).

$$\begin{gathered} HB_{(infneck)} = f(\text{basic chemical elements}) \\ HB_{(supneck)} = f(\text{basic chemical elements}) \\ HB_{(body)} = f(\text{basic chemical elements}) \\ HB_{(infneck)} = f(\text{alloying chemical elements}) \\ HB_{(supneck)} = f(\text{alloying chemical elements}) \\ HB_{(body)} = f(\text{alloying chemical elements}) \end{gathered} \quad (2)$$

$$\begin{gathered} HB_{(infneck)} = f(C, Si, Mn); \\ HB_{(infneck)} = f(Ni, Cr, Mo); \\ HB_{(supneck)} = f(C, Si, Mn); \\ HB_{(supneck)} = f(Ni, Cr, Mo); \\ HB_{(body)} = f(C, Si, Mn); \\ HB_{(body)} = f(Ni, Cr, Mo); \end{gathered} \quad (3)$$

Following the experiments we determine the mechanical features according to the technological parameters of influences in the process. Because we dispose of real data, afterwards it is required to present the model of optimization on industrial data, sampled from rolling mills rolls. As parameters for optimization we selected:

- *the Brinell hardness, measured on the body of rolls, $HB_{(body)}$;*
- *the Brinell hardness, measured on the necks of rolls, $HB_{(infnecks)}$ and $HB_{(supnecks)}$.*

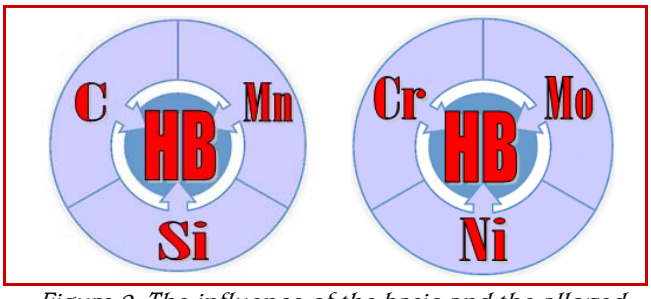

Figure 2. The influence of the basic and the alloyed elements upon the brinell hardness, in mathematical perspective

In order to reduce the experiments number and to simplify the optimization calculi, among the parameters of influence, we chose the chemical composition of the cast irons with nodular graphite. These hypotheses lead the optimization model through the prism of the multi-component correlations in formula (II).
The industrial data are modeled in the form of equation (4). We consider the variations limits of the variables (x, y, z), as well as the variation limits of the analyzed features. Also, in the limits of graphical representation (lim x_{inf}, lim x_{sup}, lim y_{inf}, lim y_{sup}, lim z_{inf}, lim z_{sup}), as well as the average values of the variables and of the analyzed features (x_{med}, y_{med}, z_{med}, u_{med}) are stated.

$$u(x, y, z) = C_1 x^2 + C_2 y^2 + C_3 z^2 + C_4 y z + C_5 x z + C_6 y x + C_7 x + C_8 y + C_9 z + C_{10} \quad (4)$$

At that rate, the equations of the regression hyper-surfaces are in equation (3), for which there is a correlation coefficient (rf) and a deviation from the regression surface (sf).

THE PRESENTATION OF GRAPHICAL ADDENDA

Figure 3 presents the screen which generates the regression surfaces of the variable ($HB_{(body)}$, $HB_{(infnecks)}$, $HB_{(supnecks)}$) for the cases $x = x_{med}$, $y = y_{med}$ and $z = z_{med}$, waves x, y, z represent combination of chemical elements depending on the mathematical model under study.

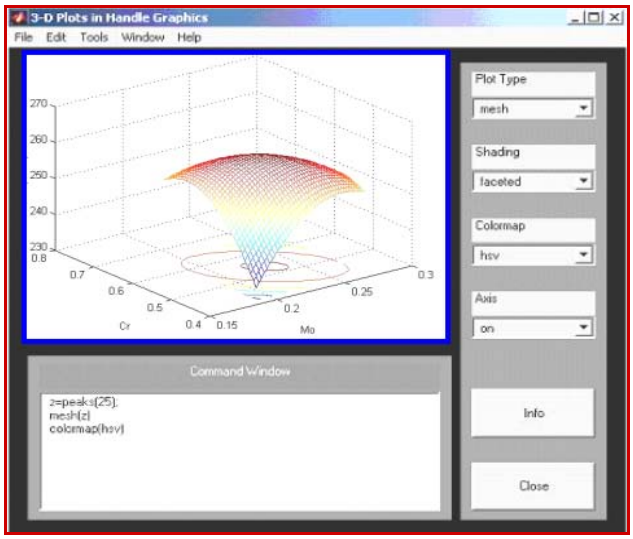

Figure 3. Regression surface of the variabile u ($HB_{(body)}$, $HB_{(infnecks)}$, $HB_{(supnecks)}$) for the cases $x = x_{med}$, $y = y_{med}$ and $z = z_{med}$

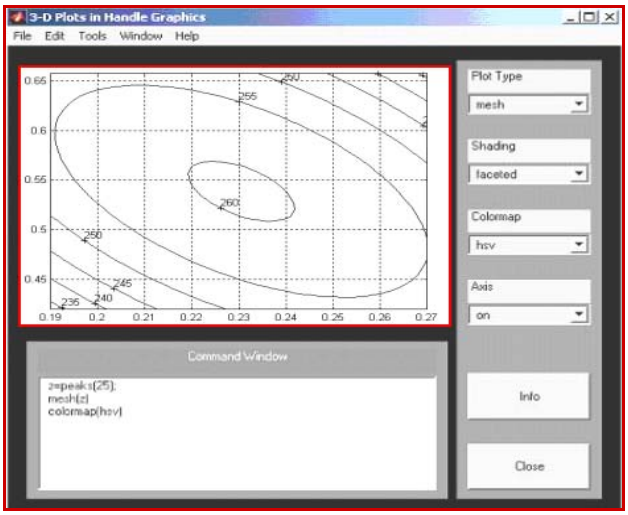

Figure 4. The level curves generation for the dependences u = f(x, y, z), formally u = f(x_{med}, y, z), u = f(x, y_{med}, z) and u = f(x, y, z_{med})

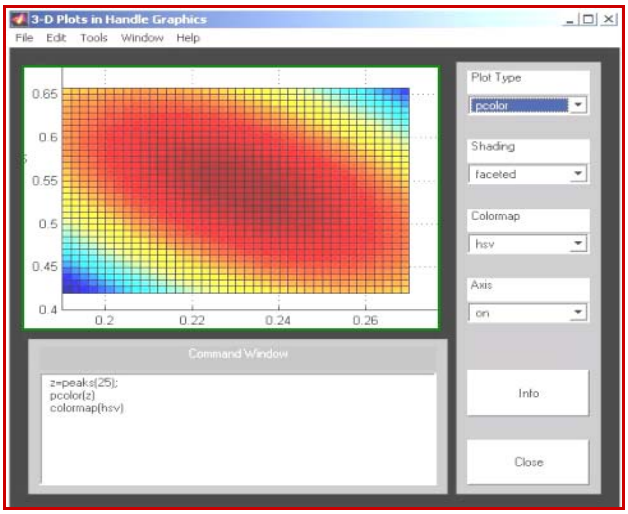

Figure 5. Screen for the variation domain generation of the dependences u = f(x, y, z), formally u = f(x_{med}, y, z), u = f(x, y_{med}, z) and u = f(x, y, z_{med})

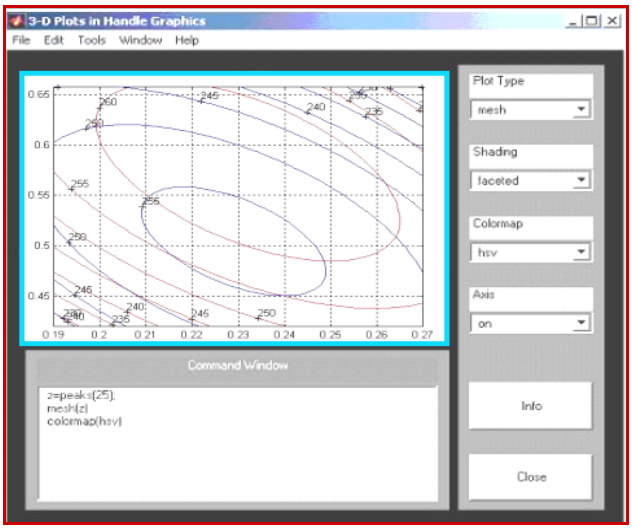

Figure 6. Screen for the adjusting diagrams generation built for the average values ale parameters (x_{med}, y_{med}, z_{med})

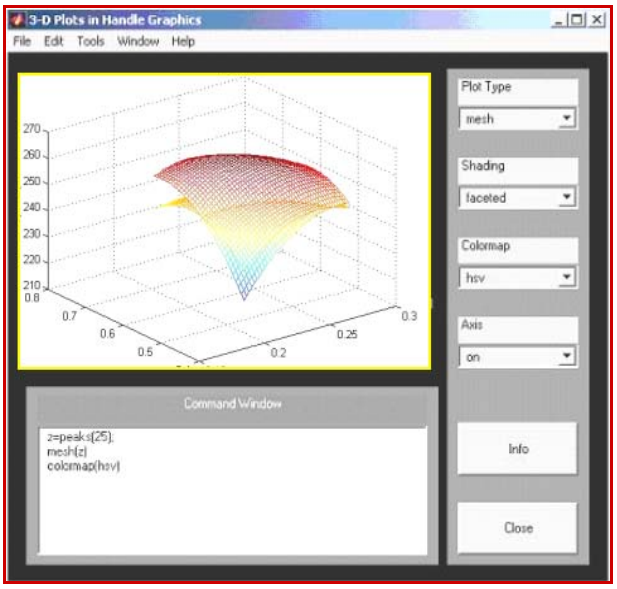

Figure 7. Screen for the regression surface volume variation generation for the average values $x = x_{med}$, $y = y_{med}$ and $z = z_{med}$

Figure 4 presents the program screen capture which generates the level curves of the dependence $u = f(x, y, z)$, formally $u = f(x_{med}, y, z)$, $u = f(x, y_{med}, z)$ and $u = f(x, y, z_{med})$ for the cases $x = x_{med}$, $y = y_{med}$ and $z = z_{med}$. This level curves represents the projection in the two-dimensional plan of the regression surfaces presented in the Figure 3.

Figure 5 presents the screen which generates the variation domain of the characteristics $u = f(x, y, z)$, formally $u = f(x_{med}, y, z)$, $u = f(x, y_{med}, z)$ and $u = f(x, y, z_{med})$ for the cases $x = x_{med}$, $y = y_{med}$ and $z = z_{med}$. This geometrical areas represents level curves variations in the two-dimensional plan.

These diagrams are built for the average values of the parameters (x_{med}, y_{med}, z_{med}), only that through the representation of the diagrams for parameters values contained in the variations limits we can obtain adjusting diagrams (Figure 6), with which we can completely controlled the process.

Figure 7 presents the screen, which generates the correlation surfaces, meaning the projection in the two-dimensional plan of the variation volumes of the regression surfaces. These are obtained through superposing of the $u = f(x_{med}, y_{med}, z_{med})$ and one of surfaces corresponding for the average values $x = x_{med}$, $y = y_{med}$ and $z = z_{med}$, meaning $u = f(x_{med}, y, z)$, $u = f(x, y_{med}, z)$ and $u = f(x, y, z_{med})$.

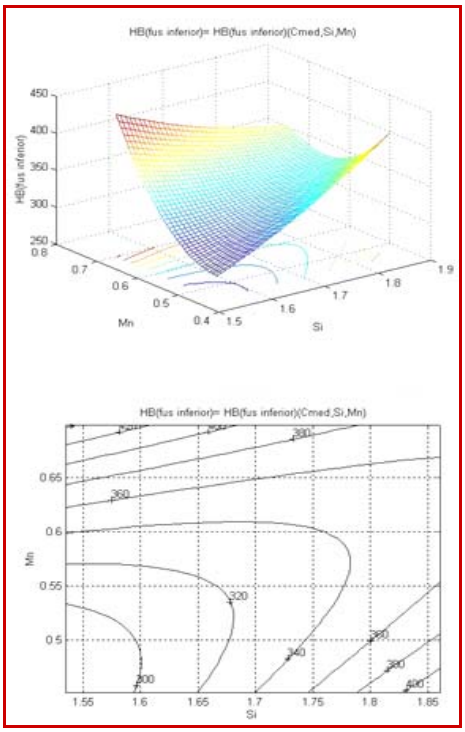

Figure 8.a The regression surface and the level curves generated by the program for the dependences between hardness and chemical composition [presented example for the variation of the parameter $HB_{(Fusinf)}$ in the cases $C = C_{med}$, in the $HB_{(Fusinf)} = f(C_{med}, Si, Mn)$ dependences]

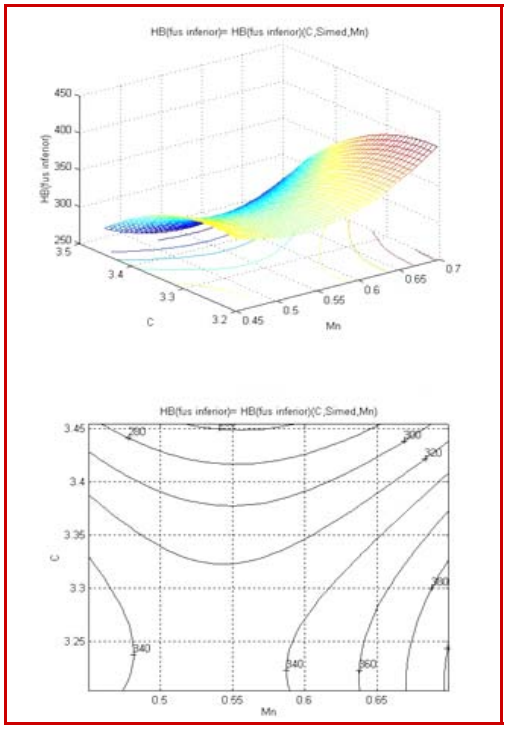

Figure 8.b. The regression surface and the level curves generated by the program for the dependences between hardness and chemical composition [presented example for the variation of the parameter $HB_{(Fusinf)}$ in the cases $Si = Si_{med}$ in the $HB_{(Fusinf)} = f(C, Si_{med}, Mn)$ dependences]

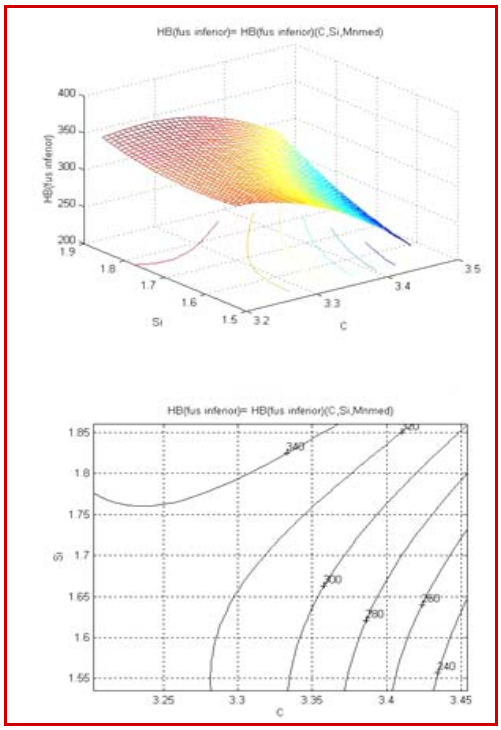

Figure 8.c. The regression surface and the level curves generated by the program for the dependences between hardness and chemical composition [presented example for the variation of the parameter $HB_{(Fusinf)}$ in the cases $Mn = Mn_{med}$, in the $HB_{(Fusinf)} = f(C, Si, Mn_{med})$ dependences]

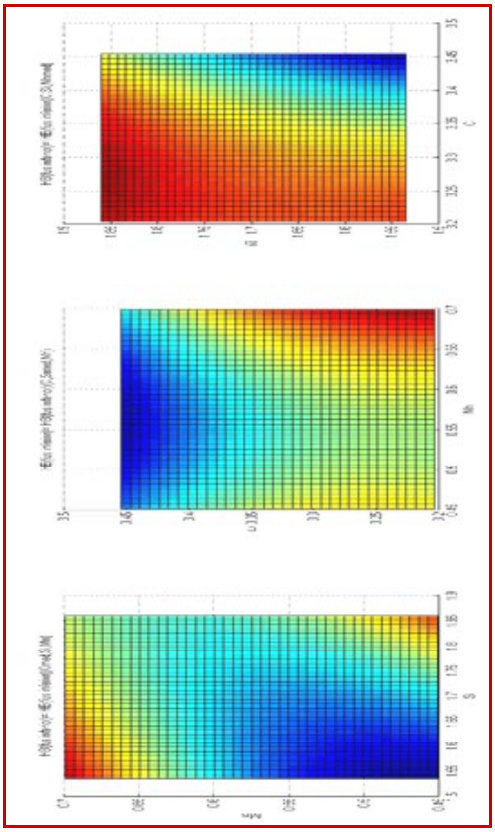

Figure 9. The variation domain in color panel presentation for the dependences between hardness and chemical composition [same cases]

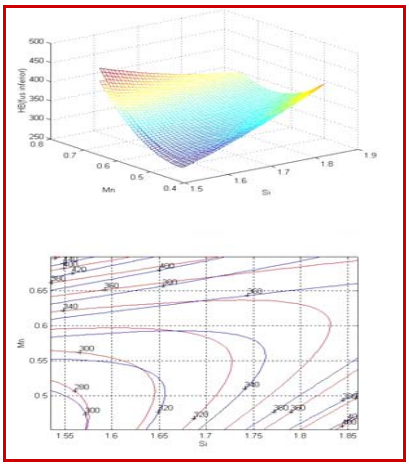

Figure 10. The regression surface volume variation domain and the adjusting diagrams for the dependences between hardness and chemical composition [case $C = C_{med}$]

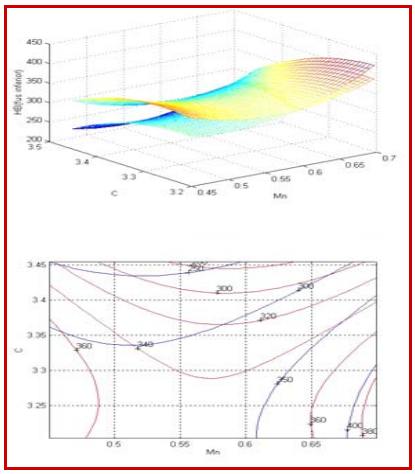

Figure 10. The regression surface volume variation domain and the adjusting diagrams for the dependences between hardness and chemical composition [case $Si = Si_{med}$]

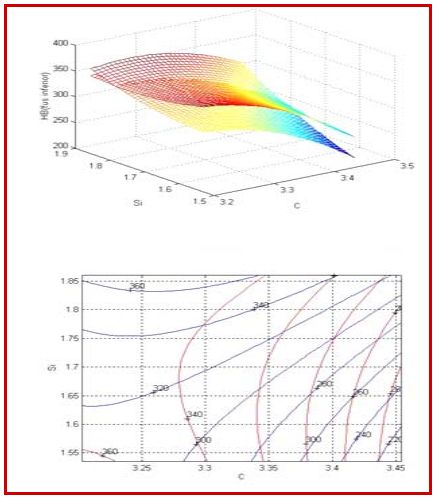

Figure 10. The regression surface volume variation domain and the adjusting diagrams for the dependences between hardness and chemical composition [case $Mn = Mn_{med}$]

CONCLUSIONS

The performed study had in view to obtain correlations between the hardness of the cast iron rolls (on the necks and on the working surface) and its chemical composition, defined by basic and the representative alloying elements. Analyzing the graphical dependences from the performed researches, based on literature review data and from own experimental work it results the fallowing conclusions:

- *the values processed were made using Matlab calculation program. Using this calculation program we determine some mathematical correlation, correlation coefficient and the deviation from the regression surface. This surface in the four-dimensional space (described by the equation) admits a saddle point to which the corresponding value of hardness is an optimal value of alloying elements.*
- *the existence of a saddle point inside the technological domain has a particular importance as it ensures stability to the process in the vicinity of this point, stability which can be either preferable of avoidable.*
- *the behavior of this hyper-surface in the vicinity of the stationary point (when this point belongs to the technological domain) or in the vicinity of the point where the three independent variables have their respective average value, or in a point where the dependent function reaches its extreme value in the technological domain (but not being a saddle point) can be rendered only as a table, namely, assigning values to the independent variables on spheres which are concentric to the point under study.*
- *as this surface cannot be represented in the three-dimensional space, we resorted to replacing successively one independent variable by its mean value. These surfaces (described by the equation), belonging to the three-dimensional space can be reproduced and therefore interpreted by technological engineers.*
- *knowing these level curves allows the correlation of the values of the two independent variables so that we can obtain a viscosity within the required limits.*

The realization of a mathematical model starting from industrial data, gathered at the rolls hardness measurement, and at the national standards reglementations, which recommends the hardness, for different chemical compositions, also determines the degree of originality of the research. The determination of the equations of regression hiperplanes, which describe the mathematical dependency between the chemical composition and the hardness, the determination of the multicomponent relations and the realization of the graphic interfaces for the representations variation areas of the cast-irons chemical composition, completes this area of preoccupations within a processing mathematical of molding and optimization.

The realization of an optimal chemical composition can constitute a technical efficient mode to assure the exploitation properties, the material from which the rolling mills rolls are manufactured having an important role in this sense. From this point of view is applied the mathematical molding, witch is achieved starting from the differentiation on rolls component parts, taking into consideration the industrial data obtained from the hardness measuration on rolls, as well as the national standards reglementations, which recommends the hardness, for different chemical compositions.

The optimum solution is determined through some mathematical restrictions to the input values that the mathematical molding is started. As a work method is chosen the way of the constraint of average successive values to some of the elements of chemical composition, leaving free the variation of a number of variables submitted to optimization. Is searched to constraint average values, inclusively to dependent variables, desired to achieve through the chemical optimum composition. It will be determined the equations of regression hiperplanes, which describe the mathematical dependency between the chemical composition and the hardness, and is searched a solution which can determine the optimum chemical composition for hardness desirable values.

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cylinders through mathematical molding of the manufacturing process and the experimental study of durability in exploitation" [KISS, I.(manager), ALEXA, V. (collaborator), between the years 2005-2008],

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AUTHORS & AFFILIATION

[1.] IMRE KISS
[2.] STEFAN MAKSAY
[3.] VASILE ALEXA

[1, 3] DEPARTMENT OF ENGINEERING & MANAGEMENT,
FACULTY OF ENGINEERING HUNEDOARA,
UNIVERSITY "POLITEHNICA" TIMISOARA, ROMANIA
[2.] DEPARTMENT OF ELECTRICAL ENGINEERING & INDUSTRIAL INFORMATICS,
FACULTY OF ENGINEERING HUNEDOARA,
UNIVERSITY "POLITEHNICA" TIMISOARA, ROMANIA

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[1] LUCIA VILCEANU, [2] EUGEN GHITA, [3] VASILE PUTAN

ASPECTS REGARDING THE LIFE-TIME OF WIRES BELONGING TO A STEEL WIRE ROPE

Abstract:
The paper presents an analysis regarding the influence of working typical factors about the shallow destruction phenomena between wires in contact. It was studied the influence of contact pressure and the relative displacement between wires concerning the life-time of wire ropes.
There is presented as a conclusion that the life-time of wires is decreasing at the increasing of the average pressure between the wire rope and the wrapping up roll. The destruction phenomenon of wires is increasing when increasing the frequency of the alternant bending process of wire rope around the roll.

Keywords:
wire rope, shallow destruction, life-time, contact pressure, fretting corrosion

INTRODUCTION

The fretting corrosion belongs to the range of phenomena going to fracture of steel machine parts under different variable forces. The fretting corrosion conduce to decreasing of fatigue limit to (1,5...3) times.
The above mentioned phenomena takes place between contact surfaces in a relative motion, when friction forces are acting on small contact areas due to roughness of joining surfaces. In the same time, heat is locally emitted producing punctual welding processes. A transfer of metallic powder between contact surfaces is produced. Because of chemical reactions with the oxygen included in atmosphere, the metallic powder is turning into oxides and nitrides. The degree of wear has high values in case of dry fretting, and small values in case of lubrication [3]. For wire ropes the influence factors about the fretting corrosion are as follows: the contact pressure, the amplitude and the frequency of relative displacement, the state of stress in the common contact area.
The interpretation of the fretting corrosion phenomena is based on the observation that high values of the contact stresses are located in the contact area. These stresses in correlation with relative displacements of contact surfaces are producing fractures of small particles. Taking into account the influence of the emitted heat, because of friction, the oxides are produced going to a wearing effect and facilitating the appearance of the fatigue cracks.
For the steel wire ropes subjected to a tensile test, the fretting corrosion is produced between the component wires as well between the external wires and the wrapping up roll. The favorable effect of lubrification about the life-time of wire ropes is unanimously accepted.

THE FACTORS OF INFLUENCE CONCERNING. THE DESTRUCTION PROCESSES INTO THE CONTACT AREAS

Contact pressure

The contact compression, together with other loadings, conduces to a three-axis state of stress. The final result may be the appearance of the critical state, going to fracture, in layers as far as a half of the breadth of the contact ellipse [1]. Hertz's formula is usually used in order to calculate the maximum contact pressure between the wire rope and the wrapping up roll. The relation is valid only for elastic deformations:

$$p_0 = -\frac{3 \cdot P_0}{2\pi \cdot a \cdot b} \quad [N/mm^2], \qquad (2.1)$$

where:
Po [N] - pressing on force between bodies in contact;
a, b [mm]- half-axis of the contact ellipse:

$$a = 1{,}4 \cdot \nu \cdot \sqrt[3]{\frac{P_0}{E \cdot \sum \rho}},$$

$$b = 1{,}4 \cdot \nu \cdot \sqrt[3]{\frac{P_0}{E \cdot \sum \rho}} \qquad (2.2)$$

$\nu = 0{,}33$ - Poisson's ratio;
$E = 2{,}1.10^5$ N/mm² - Young's modulus;
$\sum \rho$ - the amount of curvatures of contact surfaces.

The average pressure between wire rope and wrapping up roll is expressed as:

$$p_m = \frac{2 \cdot T}{D \cdot d} \quad [N/mm^2], \qquad (2.3)$$

where:
T [N] - traction force;
D [mm] - diameter of roll;
d [mm] - diameter of wire rope.

The formula may be used for multi-layer wire ropes. The maximum contact pressure between wires may be written as $p_{0max} = 2\sigma_r$, where σ_r [N/mm²] represent the strength at fracture of wire. When exceeding this value, the momentary destruction is not produced, but a decreasing of the life-time always appears.

The friction between wires

The estimation of friction coefficient at high pressures on the surfaces of wires is very necessary especially for the manufacturing process of wires.
The influence of the diameter of wire about the friction coefficient may be neglected. It may be considered that the well known dependence between friction coefficient and perpendicular force remain still valid.
As a lubricant very often used for wire ropes, the oil ensure suitable values for the friction coefficient.

The relative displacement of wires

The amplitude of relative displacement between the contact surfaces of wires is due to different values of stretching stresses in wires as well to different deformations of adjacent wires because of the bending process at different diameters [4]. The relative displacement of wires is caused by the diameters of layers, the length of the volute line for a single step having the following formula:

$$L = 2 \cdot \pi \frac{r}{\cos^2 \alpha} \qquad (2.4)$$

where:
r [mm] - the radius of the layer;
α - the wrapping up angle of wires in a layer.

There is very difficult to take into account all the above mentioned influence factors for the destruction phenomena of wires. The difficulty is caused by the relative dependence between factors.
So, the principle of superposition regarding the effects of the influence factors may not be used. It is of a great practical importance to establish perceptually the decrease of the fatigue limit of wires when the wires are separately leaded in comparison with the same parameter for the wire as a component part of the wire rope.

THE EXPERIMENTAL ANALYSIS OF THE INFLUENCE OF PRESSURE AND RELATIVE DISPLACEMENT ABOUT LIFE-TIME OF A WIRE ROPE

There are considered the following stresses:

- traction produced by the force T, going to the stress in wire rope

$$\sigma_t = \frac{T}{A} \qquad (2.5)$$

- primary bending because of the wrapping up around the roll with a diameter D, going to the stress in wire rope

$$\sigma_i = \pm E\frac{\delta}{D} \qquad (2.6)$$

δ [mm] - diameter of wire;
$E = 2{,}1 \cdot 10^5$ N/mm^2.
The fatigue tests conduce to fractures of wires especially in the contact area between the wire rope and the drain of roll. So, this contact zone will be analyzed. For fatigue and life-time tests, loading cycle is characterized by the following parameters:

$$\sigma_{max} = \sigma_t; \quad \sigma_{min} = \sigma_t - \sigma_i;$$
$$\sigma_{med} = \sigma_t - \sigma_i/2 \quad \text{and} \quad \sigma_{am} = \sigma_i/2$$

For the particular case $\sigma_t = \sigma_i$ a pulsate bending cycle is obtained.
Moreover, a pulsate compression cycle will be added having the maximum pressure p_0 in the volute zone and 0 in the stretching zone of the wire rope. So, the life-time N_s of wire, which was loaded under a pulsate cycle with $\sigma_{max} = \sigma_t$, may be compared with the life-time N_c of a wire, which was loaded under a similar cycle and an added pulsate pressure (0...p_0).
Because only the fatigue limit for a symmetrical cycle may be estimated for wires, the Soderberg's diagram is used. The diagram is approximated as a part of an ellipse having the half-axis σ_{-1} and σ_c. Instead of σ_c may be used the strength at fracture σ_r.
So, the following formula will be obtained:

$$\sigma_{-1Nc} = \frac{\sigma_0 \cdot \sigma_r}{\sqrt{4 \cdot \sigma_r^2 - \sigma_0^2}} \quad [N/mm^2], \qquad (2.7)$$

The fatigue tests have been performed [2] in the Laboratory of Strength of Materials from the Mechanical Engineering Faculty of Timisoara.
A loading machine Schenk has been used for fatigue tests in the framework of life-times in the proximity of the value $N = 10^6$ cycles. The method of loading steps has been preferred in order to estimate the fatigue limit. The principle of the method consists in modifying the level of loading function of the level of stress obtained for the previous test. If the previous specimen has been fractured, the following specimen will be loaded at a smaller level of stress. For the opposite case, it will be used a higher level of stress. The test will continue until the whole range of specimen will be loaded. Results are presented in Table 1.
The advantage of the method consists in grouping the results around an average value. The drawback consists in the impossibility to perform simultaneously different specimens. So, the result of the previous test is necessary.

Table 1

σ [N/mm^2]	fractured wires • not-fractured wires **0**	$N=10^6$ cycles			
		$i = \sigma_i - \sigma_0$	n	$i.n$	$i^2.n$
350		50	1	50	2500
340		40	2	80	3200
330	• • •	30	5	150	4500
320	**0** • • **0** •	20	7	140	2800
310	**0 0** **00**	10	4	40	400
300	**0**	0	1	0	0
		$\Sigma =$	20	460	13400

The fatigue limit of wire may be calculated by using the following formula:

$$\sigma_{-1Ns} = \sigma_1 + \frac{\Sigma(i \cdot n)}{\Sigma n} = 300 + \frac{460}{20} = 323 \quad [N/mm^2], \qquad (2.8)$$

where: σ_1 - is the reference level of stress, arbitrarily estimated for the smallest value of loading during the test.
The fatigue tests of wire ropes have been performed on a special loading machine designed by the lamented prof.dr.eng. Lazar Boleantu [2]. An usual wire rope 17 - 6x37 -160 S-Z, STAS 1513-80, with the diameter of a single wire $\delta = 0{,}8$ mm and the area of the cross-section $A = 112$ mm^2, has been tested.
There is emphasized in Figures 1 and 2 the life-time of wire rope for three different loading steps characterized by the stress $\sigma_t = T/A$ and by the diameter of roll. For every step, three specimens

have been tested. The dispersion of results for a single loading step is located into the area of a rectangle. The hachure indicates the loading step for a fatigue pulsate cycle. It may be observed a relative small difference between the averages values of life-time for the two loading frequencies as well a favorable effect of low loading frequency about the life-time of wire rope.

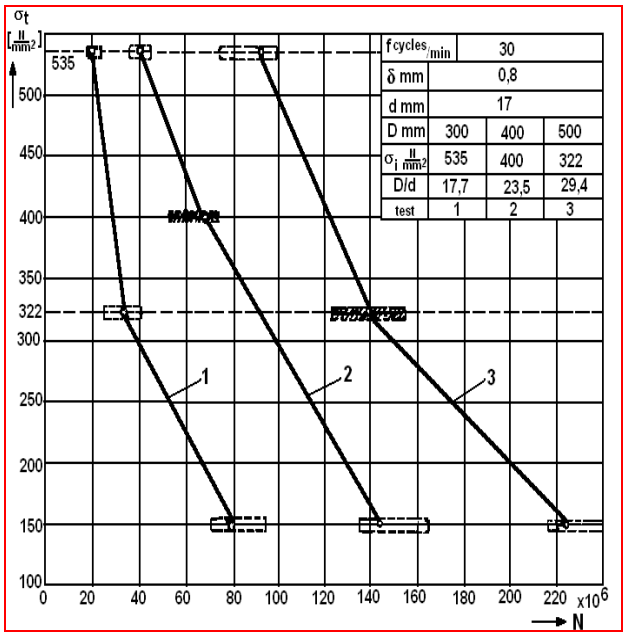

Fig. 1. Tests performed at frequencies of 30 cycles/min

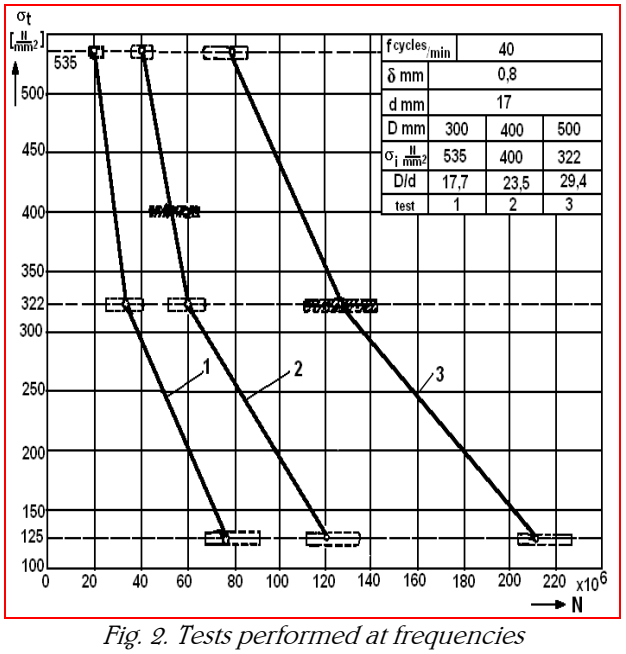

Fig. 2. Tests performed at frequencies of 40 cycles /min

The decreasing coefficient, regarding the fatigue limit of a wire belonging to a wire rope in comparison with the strength of a single wire for life-time N = 10^6 cycles, has been calculated according to the formula:

$$c_\sigma = \frac{\sigma_{-1Ns}}{\sigma_{-1Nc}} \qquad (2.9)$$

Results are presented in Table 2.

Table 2.

Test	*1*	*2*	*3*
D[mm]	*300*	*400*	*500*
$\sigma_0 = \sigma_t = \sigma_i = E\delta/D$	*535*	*400*	*322*
σ_r *[N/mm²]*	*1600*		
$\sigma_{-1Nc} = \frac{\sigma_0 \cdot \sigma_r}{\sqrt{4\cdot\sigma_r^2 - \sigma_0^2}}$ *[N/rnm²]*	*266*	*208*	*163*
σ_{-1Ns} *[N/mm²]*	*323*		
$c_\sigma = \frac{\sigma_{-1Ns}}{\sigma_{-1Nc}}$	*1,23*	*1,55*	*1,98*
N_s *[cycles]*	10^6		
N_{cmediu}	*(19968) 19748*	*(68058) 51684*	*(138764) 124096*
$C_N = N_s/N_c$	*50*	*14,75*	*7,24*
p_m *[N/mm²]*	*22,4*	*13,2*	*8,55*
p_0 *[N/mm²]*	*7850*	*6420*	*5540*
$\Delta\varepsilon = \frac{2\delta^2}{D(D+2\delta)}$	$1,39.10^{-5}$	$0,8.10^{-5}$	$0,5.10^{-5}$

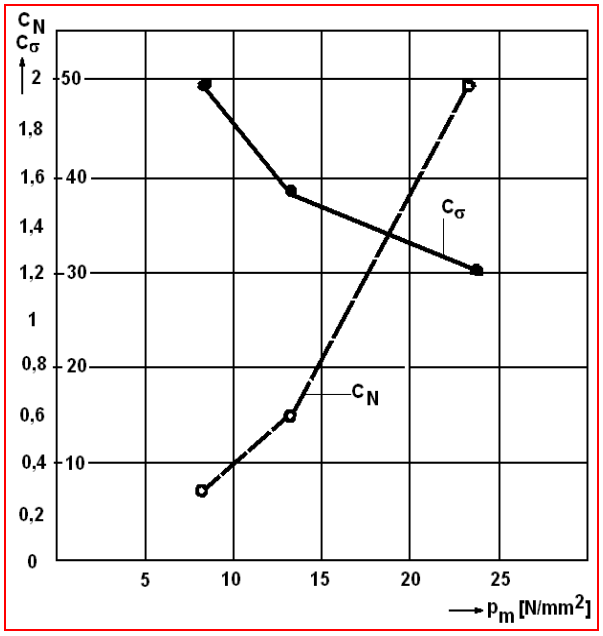

Fig.3. The variations of c_σ and c_N for the pulsate testing cycle

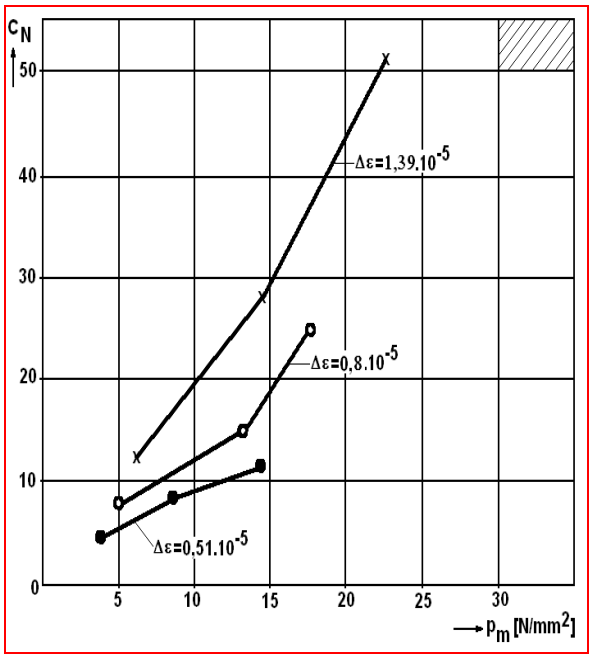

Fig.4.The variation of c_N function of the average pressure p_m

There are presented in Fig. 3 the variations of c_σ and c_N for the pulsate testing cycle $\sigma_o = \sigma_t = \sigma_i$, corresponding to the average pressure p_m. It may be observed that if c_σ is increasing, c_N is decreasing. In the same time, the increasing of p_m has a non-favorable influence about the life-time of wire rope.

There is presented in Fig. 4 the variation of c_N function of the average pressure p_m between wire rope and wrapping up roll.

The parameter $\Delta\varepsilon$ is representing the relative displacement between the layer of wires in contact with the roll and the internal layer located in the near vicinity, divided by the unit of length.

There is ascertained a high value of the increasing slope of c_N when increasing the average pressure p_m, for high values of $\Delta\varepsilon$.

CONCLUSIONS

- *The life-time of wires belonging to a wire rope is decreasing at increasing of the average pressure between the wrapping up roll and the wire rope. The dependence is valid for bending pulsate loading cycles (Fig. 3), as well for an uneven loading cycle (Fig. 4).*
- *At constant pressure, the life-time of wire rope is decreasing at increasing of $\Delta\varepsilon$, the relative displacement between the layer of wires in contact with the roll and the internal layer located in the near vicinity (Fig.4). As increase because of the bending loading of wires due to wrapping up and bending of wire rope around the roil.*
- *Tests performed at frequencies of 30 respectively 40 cycles /minute prove that the destruction process increase when the frequency increase too, going to decreasing the life-time of wire rope. The reason consists in increasing the level of friction force between wire rope and roll because of increasing the angular acceleration. In the same time because of increasing the friction force, there is also increasing the local maximum pressure but is decreasing the elliptical contact surface. Both consequences have a non-favorable influence about the life-time of wires due to increasing the amplitude of contact pressure.*
- *A strongly increasing of the value of coefficient c_N, in case of bending loading cycles, is observed after a comparative analysis between a pulsate cycle (Fig.3) and an uneven cycle (Fig.4). A favorable effect about the life-time of wire ropes is obtained by superposing a compression or a traction stress over a contact compression stress.*
- *After analyzing the dispersion fields of the number of cycles (the rectangles in Fig.1 and 2) it may be observed the increasing of dispersion when increasing the number of cycles until the appearance of fracture. The explanation consists in the timely cumulative effect of wear. That is because the contact pressure and the bending-traction effects have an insufficiently importance.*
- *The wear is strongly dependent on the friction coefficient between wire rope and wrapping up roll, as well between wires of the same wire rope. So, in order to decrease the level of wear it is necessary to decrease the friction coefficient by using a suitable lubrication. In the same time it is necessary to decrease the starting and the breaking accelerations which have an important influence about the relative sliding between the wire rope and the wrapping up roll.*

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AUTHORS & AFFILIATION

[1] LUCIA VILCEANU,
[2] EUGEN GHITA,
[3] VASILE PUTAN

[1, 3] DEPARTMENT OF ENGINEERING & MANAGEMENT,
FACULTY OF ENGINEERING HUNEDOARA,
UNIVERSITY "POLITEHNICA" TIMISOARA, ROMANIA

[2] FACULTY OF MECHANICAL ENGINEERING,
UNIVERSITY "POLITEHNICA" TIMISOARA, ROMANIA

ACTA TECHNICA CORVINIENSIS
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[1] CRISTIAN P. CHIONCEL, [2.] LADISLAU AUGUSTINOV,
[3.] PETRU CHIONCEL, [4.] NICOLETA GILLICH, [5.] GELU OVIDIU TIRIAN

PERFORMANCE RATIO OF A PHOTOVOLTAIC PLANT

Abstract:
To be able to choose the right photovoltaic equipment, starting from modules through inverters, for grid connected plants, at least one year of consistent evaluations of system performance are needed. One of those performance parameters that allow the detection of operational problems and facilitate the comparison of systems is given by the final yield factor and the performance ratio.
Based on the grid connected photovoltaic plant at the University 'Eftimie Murgu' in Resita, injecting energy in the public grid since spring 2008, we define and analyze the performance ratio and the final yield factor. With these two factors given, we are able to assure a critic overview of the plant performance.

Keywords:
photovoltaic plant, ratio, final yield factor, monitoring

INTRODUCTION

To be able to choose the right photovoltaic equipment, starting from modules through inverters, for grid connected plants, at least one year of consistent evaluations of system performance are needed. One of those performance parameters that allow the detection of operational problems and facilitate the comparison of systems is given by the final yield factor and the performance ratio.

YIELD FACTOR AND PERFORMANCE RATIO FOR GRID CONNECTED SOLAR PHOTOVOLTAIC PLANTS

The International Energy Agency (IEA) for Photovoltaic Power System Program has define, based on existing experience, a number of performance parameter for photovoltaic plants, that are now concentrated in the IEC standard [1], concept that are only meaningful in the context of using regenerative energy sources, as photovoltaic plants, insular ore grid connected. The main parameters are performance ratio and the final PV system.
The performance ratio PR is defined as the energy output E_{pv} that is injected in the grid, AC part, divided by the nameplate d.c power $P_{maxG,STC}$, obtained in Standard Test Condition (STC - 1000 W/m^2, 25^{0}C) of the installed PV array. It represents the number of hours that the PV array operates at its rated power.

$$PR = \frac{AC - GridinjectedEnergy}{PVSystemEnergyInSTC} \qquad (1)$$

Performance ratio PR values are typically reported on a monthly or yearly basis. Another yield value is the final Yield factor. As the performance ratio, it expresses plant performance on the AC site. It is definite as the

monthly grid injected energy divided to the nameplate power of the photovoltaic generator in standard test conditions. The result offers an overview referring to monthly pro one kWp plant power, in the grid injected energy, ore the so called monthly specific energy production.

$$Y_f = \frac{E_{PV,AC}}{P_{\max G,STC}} \qquad (2)$$

PR values calculated can be also calculated for smaller intervals, such as weekly or daily. This is may be useful for identifying occurrences of component failures. Depending on geographical location and season the PR values fall normally within the range 0.2 to 0.8. If PR decreases yearly, this may indicate a permanent loss in performance. Ideal annual values for the performance ratio PR factor are between 0.8 and 0.84.

PR does not indicate the amount of produced energy, because a system with low PR in a high solar resource location might produce more energy than a system with a high PR in a low solar resource location. But however, for any given system, location and time an increase of the performance ratio PR supposes accordingly an increase of the final yield Y_f too.

If PR registers a deep decrease, that indicates events with significant performance impact, like inverters that are not operating proper. When the PR decrease moderate, this indicates that the plant has less sever problems. So, based on the performance ratio PR analyzes, it can be clearly identified if the systems work like plant ore problems exist, but not the cause.

GRID CONNECTED PHOTOVOLTAIC PLANT AT THE UNIVERSITY 'EFTIMIE MURGU' RESITA

The grid connected photovoltaic system [3] mounted at the University `Eftimie Murgu` Resita, has in his structure, following components: four high performance standard solar modules of type Multisol 150, manufactured by Scheuten Solar – Germany [6], with a total capacity of 740W/h; a Sunny Boy 1100 inverter and a completely online monitoring system [7] of the PV system: Sunny Webbox and Sunny Sensorbox (solar radiation, ambient and module temperature, wind speed and direction).

Figure 1. The solar photovoltaic modules at the "E.Murgu" University Resita

Figure 2. The equipment at the "E.Murgu" University Resita

PERFORMANCE RATIO AND FINAL YIELD FACTOR FOR THE GRID CONNECTED PV SYSTEM AT THE "EFTIMIE MURGU" UNIVERSITY

In this paragraph we will obtain an overview of the final yield factor Y_f for the grid connected photovoltaic system, from May 2008 until the March 2009.

Figure 3 represents the monthly performance ratio; figure 4 the final yield factor for this period. A comparison between those two plant performances indicators are given in figure 5.

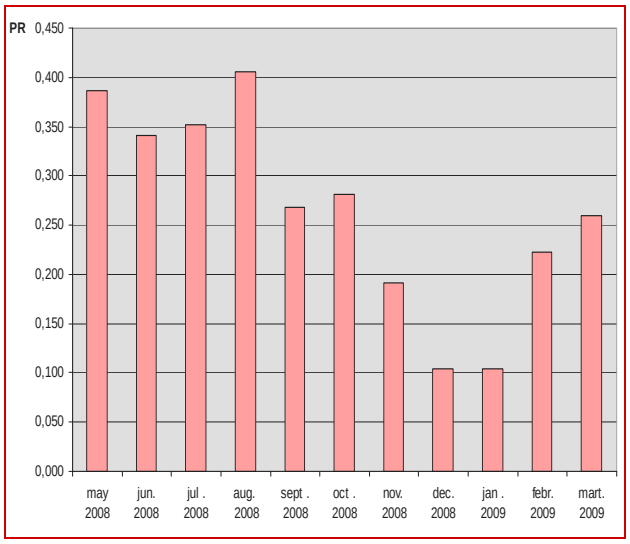

Figure 3. Monthly grid connected PV system performance ratio, May 2008 – March 2009

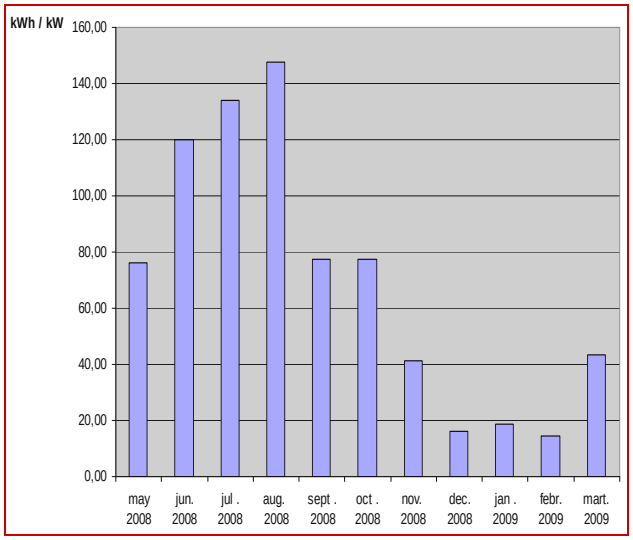

Figure 4. Final yield factor, May 2008 – March 2009

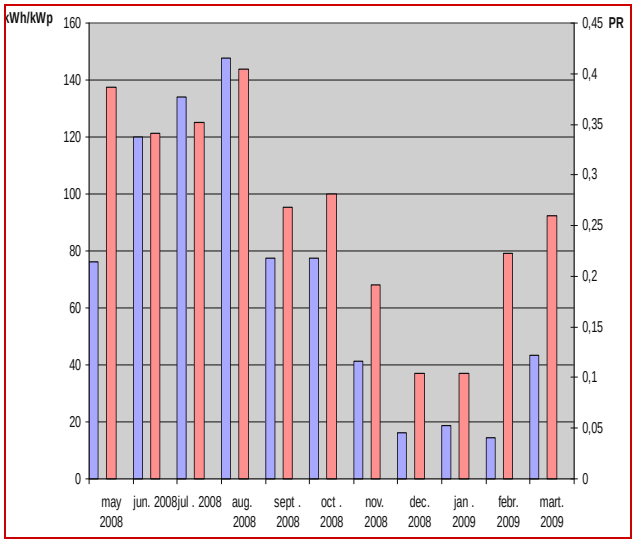

Figure 5. Comparison between Final Yield and Performance Ratio, May 2008 – March 2009

CONCLUSION

Based on the analyze of the final yield factor and the performance ratio of an photovoltaic grid connected plant, we can always have a overview of the plants performance and check in the right if we register system losses.

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AUTHORS & AFFILIATION

[1] CRISTIAN P. CHIONCEL,
[2] LADISLAU AUGUSTINOV,
[3] PETRU CHIONCEL,
[4] NICOLETA GILLICH,
[5] GELU OVIDIU TIRIAN

[1,2,3,4] UNIVERSITY "EFTIMIE MURGU" RESITA, ROMANIA
[5] FACULTY OF ENGINEERING HUNEDOARA, UNIVERSITY "POLITEHNICA" TIMISOARA, ROMANIA

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[1.] CORINA MARIA DINIŞ, [2.] CORINA DANIELA CUNTAN,
[3.] GABRIEL NICOLAE POPA, [4] ANGELA IAGĂR

STUDY OF LOW-SIGNAL AMPLIFIERS WITH FIELD-EFFECT TRANSISTORS

Abstract:
In this work are presented the types of amplifier stages with field-effect transistors, as well as the diagrams of the low-signal amplifiers achieved with TEC-J for the three connection types: common-source, common-grid and common-drain. Also, using the EWB-Multisim 8 program, it was simulated the operation of the amplifier with TEC-J in common-source connection, the amplifier with TEC-MOS in common-drain connection and the cascode amplifier with two TEC-J transistors .

Keywords:
TEC transistor, Voltage amplification, Current amplification, Amplifier, Simulation, Multisim 8

INTRODUCTION

The models which describe the operation at small signal variations have in view a description of the transistors' behavior in applications of amplifier stages' type. In these applications, the transistors are polarized in the characteristics' area where these are almost horizontal lines; against the collector, the transistors are equivalent with a controlled current generator and behave linearly. In the respective circuits' operation, the effect of the charges accumulated in junctions or other regions of the transistors is the one of some capacitors which produce phase differences and dampings with frequency.
The small signal variations are the voltage and current variations situated within an interval relatively restricted around some continuous components, interval where the device's behavior can be described by linear equations. The device's equivalent diagram is composed by linear components, of which values depend generally to the operation static point (the continuous components of voltages and currents through the device). The voltage and current variations are small, but the time-variation speeds are not neglectable, thereby the accumulations of electric charges in the device should be taken in consideration

TEC-J and TEC-MOS BEHAVIOR AT SMALL SIGNAL VARIATIONS

The operation static point should be in the saturation region of the drain current (Fig. 1). In this operation regime, the equation of the TEC-J transistor is:

$$I_D = I_{DSS} \cdot \left(1 - \frac{V_{GS}}{V_P}\right)^2 \qquad (1)$$

$$dI_D = 2\,I_{DSS}\cdot\left(1-\frac{V_{GS}}{V_P}\right)\cdot\left(-\frac{dV_{GS}}{V_P}\right) = 2\,I_{DSS}\cdot\sqrt{\frac{I_D}{I_{DSS}}}\cdot\left(-\frac{dV_{GS}}{V_P}\right) \quad (2)$$

Using the same convention to note the variations and the components $v_{GS}=V_{GS}+v_{gs}$ *and* $i_D=I_D+i_d$, *we have the correspondence:*

$$dI_D \to i_d \text{ and } dV_{GS} \to v_{gs} \quad (3)$$

$$i_d = -2\frac{\sqrt{I_D\,I_{DSS}}}{V_P}\cdot v_{gs} \quad (4)$$

The TEC-J transistor's slope is:

$$g_m = \left.\frac{i_d}{v_{gs}}\right|_{V_{DS}=constant} = -2\frac{\sqrt{I_D\,I_{DSS}}}{V_P} \quad (5)$$

The higher the drain current, the higher the slope. The maximum slope of a TEC-J is obtained at $V_{GS}=0$ *and has the value:*

$$(g_m)_{\max} = \left|2\,I_{DSS}/V_P\right| \quad (6)$$

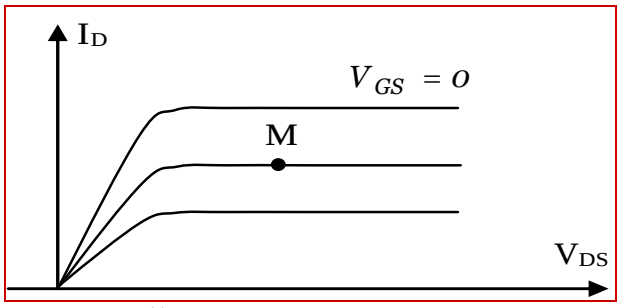

Fig. 1. TEC-J's operation point as amplifier

The small variations $v_{gs}>0$ *of the grid-source voltage produce the following effects:*

- *the drain current's increase due to the increase of the channel's conductance (the channels' area increases);*
- *the electric charge accumulated in the passing region of the grid-channel junction modifies in the source's region and, as result, is necessary a grid current to supply this modification* $i_g' = C_{gs}\cdot\frac{dv_{gs}}{dt}$ *where* C_{gs} *is the barrier capacity of the grid-channel junction in the source's area;*
- *the drain-source voltage modifies (following the modification of the drain current), which leads to the modification of the electric charge acummulated in the passing region of the grid-channel junction in the drain's region; a grid current is necessary to supply this charge modification* $i_g'' = C_{gd}\cdot\frac{dv_{gd}}{dt}$ *where* C_{gd} *is the barrier capacity of the grid-channel junction in the drain's area.*

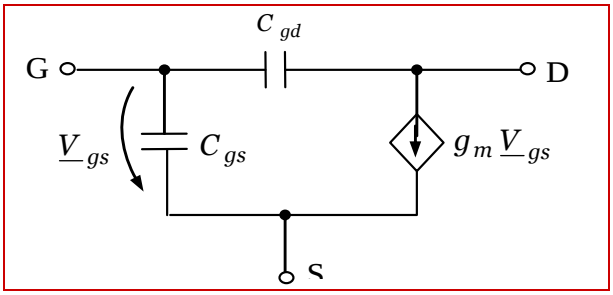

Fig. 2. TEC-J's equivalent diagram

TEC-MOS behavior is described by an equivalent diagram identical with the one from Fig. 2. Capacities C_{gs} *and* C_{gd} *correspond to the TEC-MOS' sublayer grid capacities in the source's, respectively the drain's area. The TEC-MOS' equivalent slope is obtained starting from the transistor's equation in the drain current's saturation area.*

$$I_D = k\cdot(V_{GS}-V_P)^2 \quad (7)$$

Is obtained the TEC-MOS transistor's slope:

$$g_m = 2\sqrt{k\,I_D} \quad (8)$$

AMPLIFIER STAGES

The amplifier stage is the simplest contructive block of an amplifier. It containes one or maximum two transistors which operate in controlled current source regime. For TEC, this corresponds to the drain current's saturation area. Against the drain, the transistor behaves as a current generator controlled by the voltage V_{gs}. *The three amplifier stages' types are based on the connections of the field-effect transistors:*

- *Common-source connection (Fig. 3);*
- *Common-grid connection (Fig. 4);*
- *Common-drain connection (Fig. 5).*

The presented circuits include the resistances that ensure the transistors' polarization in the reminded regions. For the amplifier stages with

TEC are presented, for exemplification, only the diagrams of the stages with TEC-J, but there are similar circuits also for TEC-MOS.
In order to simplify the diagrams, in some cases it was chosen the option of polarization from two sources. In this case, the components' number from the diagram is smaller and the equivalent diagrams for small signal variations are simpler.

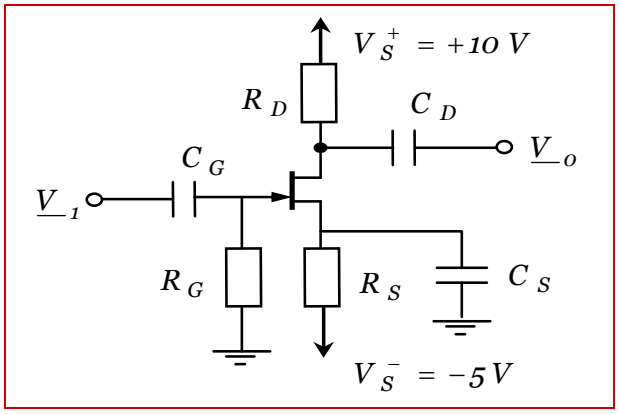

Fig. 3. Amplifier stage: Common-source

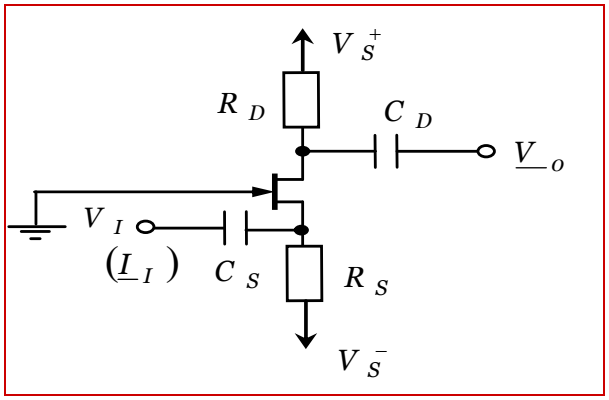

Fig. 4. Amplifier stage: Common-grid

Resistances R_G, R_S şi R_D from the common-source amplifier stage (Fig. 3) ensures the TEC-J polarization in RAN. Capacitors C_G and C_D separate the input and output in d.c. from the TEC-J polarization and allow the coupling of the input and output signals, reason for which they are also called as coupling capacitors. The capacitor C_S, also called as decoupling capacitor, is short-circuiting to earh in a.c. the source TEC-J, where from the diagram's name. The resistance R_D has an important function also in a.c., as will be seen at amplification's calculation.
In the common-grid amplifier stage (Fig. 4), the TEC-J polarization in RAN is ensured by R_S and R_D and by the supply sources V_S^+ şi V_S^-. The coupling capacitors C_S and C_D are separating in d.c. the amplifier stage from the rest of the circuit, and allow the input's and output's coupling to the circuit.

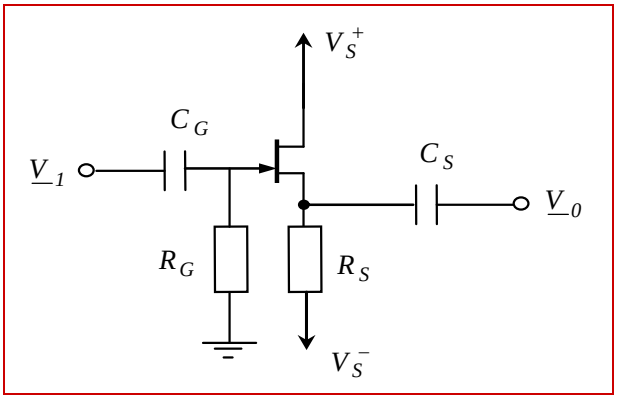

Fig. 5. Amplifier stage: Common-drain

The common-grid amplifier stage: (Fig. 5), also called as repeater-on-source, is polarized from the supply sources through the resistances R_G and R_S. The input and output coupling is achieved with the coupling capacitors C_G and C_S.
In all diagrams, the coupling and decoupling capacitors (C_G, C_D, C_S) should have sufficiently high values, in order that their impedances at operating frequencies to be considered neglectable, respectively the voltage drops on the equivalent impedances don't matter. This condition is not only dependent by the capacitors' values and the signals' frequency, but also by the resistances from the circuit.

AMPLIFIERS WITH FIELD-EFFECT TRANSISTORS (TEC)

Amplifiers with field-effect transistor (TEC) in common-source connection

Study of an amplifier with TEC-J is very similar to the one of an amplifier with TEC-MOS, therefore here is presented only an amplifier with TEC-J. A typical diagram for such an amplifier is represented in fig. 7, and its model, in which for TEC-J are used the natural parameters, is given in fig. 8.
The role of the components e_g, R_G, C_i, C_e, R_S from fig. 7 and 8 is the following: e_g - signal source, which usually is of alternative signal; T - amplifying element; R_G - equivalent internal resistance of the signal source; R_{GR} and R_D -

the TEC-J's polarization resistors; R_S - amplifier's charge (consumer); C_i ,C_e - input capacitor which couples the signal mass at the amplifiers' input, respectively the output capacitor which couples the consumer's output to the charge.

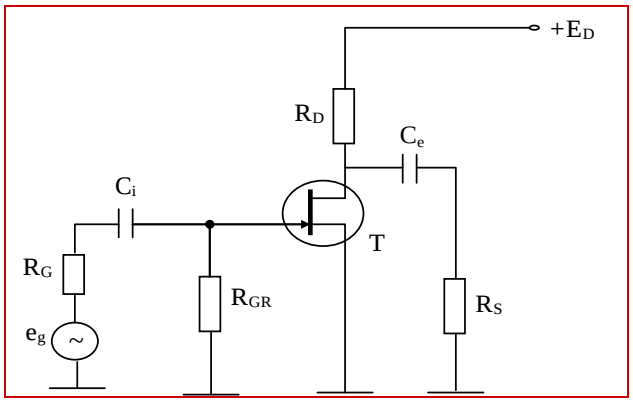

Fig. 7. Amplifier in common-source conection with TEC-J

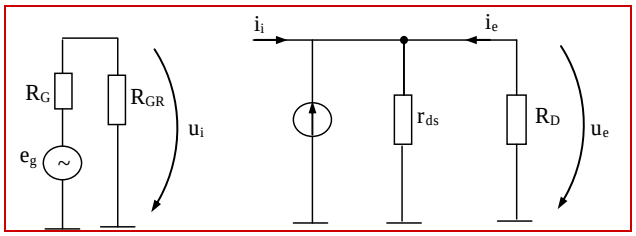

Fig. 8. Amplifier's low-signal equivalent circuit in common-source connection with TEC-J

Based on fig. 8, we have:

$$A_{us} = \frac{u_e}{u_i} = -\frac{g_m \cdot R_D}{1 + \frac{R_D}{r_{ds}}} \qquad (9)$$

Because $r_{ds} << R_D$, the frequently used relation for the voltage amplification A_u is:

$$A_{us} = -g_m \cdot R_D \qquad (10)$$

and the current amplification A_i is:

$$A_{is} = \frac{i_e}{i_i} \qquad (11)$$

The current amplification is very high, but practically is less interesting because the TEC's control is made in voltage. However, a high A_i leads finally to an amplification in power A_p very high for a stage with TEC. For the input resistance R_i and output resistance R_e, having in view the obvious neglects, are obtained:

$$R_{is} = R_{GR} \qquad (12)$$

$$R_{es} = r_{ds} \qquad (13)$$

Amplifiers with field-effect transistor (TEC) in common-drain connection (repeater-on-source)

The amplifier in common-drain connection (fig. 9) is useful in applications with requirements in accordance with its properties, i.e.:

- *Output signal in phase with the input one;*
- *Very high input resistance;*
- *Low input capacity;*
- *Low output resistance;*
- *Output signal undeformed by high amplitude at output;*
- *Voltage amplification slightly subunitary.*

Current amplification A_i is very high:

$$A_{id} = \frac{i_e}{i_i} \uparrow \qquad (14)$$

and the voltage amplification A_u is expressed by the relation (15) and has the value closed to 1.

$$A_{ud} = \frac{g_m \cdot R_D}{1 + g_m \cdot R_D} \qquad (15)$$

$$R_d = r_{ds} \,||\, R_{SU} \,||\, R_S \qquad (16)$$

The stage's own input resistance is given practically by the value of R_{GR} which should be chosen of an as high possible value, or, in some cases, equal with the value of the signal source's equivalent resistance R_G. The stage's own output resistance is low, having the value:

$$R_{ed} = \frac{1}{g_m + \frac{1}{r_{ds}}} \qquad (17)$$

and the total one R_{et}:

$$R_{etd} \cong R_S \,||\, R_{SU} \qquad (18)$$

The stage's total input capacity is:

$$C_{idt} = C_{gd} + (1 - A_u) \cdot C_{gs} \cong C_{gd} \qquad (19)$$

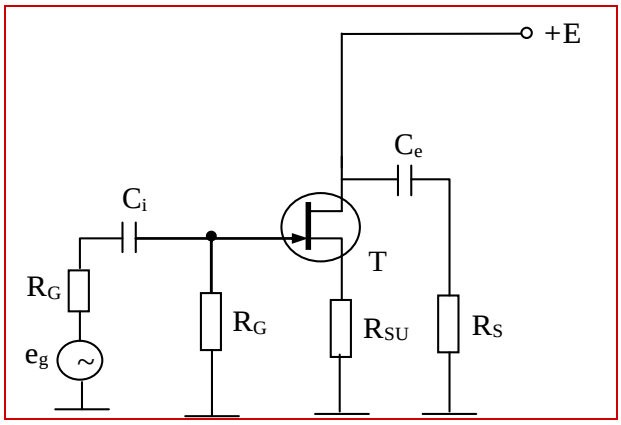

Fig. 9. Amplifier with TEC-J in common-drain connection

Amplifiers with field-effect transistor (TEC) in common-grid connection

The amplifier with TEC in common-grid connection (Fig. 10) is lesser used, and its main qualitative characteristics are the following:

- *High output impedance;*
- *Low input impedance;*
- *Unitary current amplification;*
- *Low input → output transfer capacity;*
- *The output signal is in phase with the input one.*

Under mathematical aspect, the circuit's voltage amplification is:

$$A_{ug} = \frac{(1+g_m \cdot r_{dS}) \cdot R_S}{R_S + r_{dS} + (1+g_m \cdot r_{dS}) \cdot R_S} \cong g_m \cdot (R_S \,||\, r_{dS}) \quad (20)$$

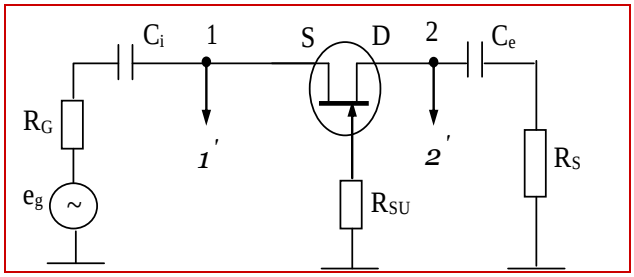

Fig. 10. Amplifier with TEC-J in common-grid connection

Simulation Of The Low-Signal Amplifiers' Operation With Tec Using Ewb-Multisim 8

The amplifier with TEC-J in common-source connection is a classic one (Fig. 11). Resistors R1 and R3 achieve the automatic polarization, R3 introducing also a negative reaction in d.c. Resistor R2 represents the drain charge of the transistor T, and Rs is the amplifier's external charge.

Capacitors C1 and C2 achieve the galvanic separation of the amplifier from the signal source, respectively from the charge. The capacitor C3 decouples totally in a.c. the resistor R3 in order not to decrease the circuit's voltage amplification.

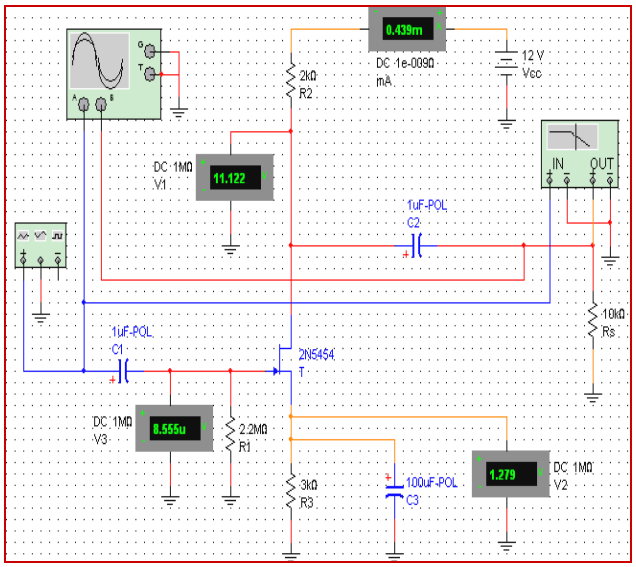

Fig. 11. The amplifier's simulation diagram with TEC-J in common-source connection

It's been achieved the simulation of this amplifier's operation for the following values of the electronic components from diagram: SV = 1 mV/10 kHz, Vcc = 12 V, T = 2N5454, R1 = 2,2 MΩ, R2 = 2 kΩ, R3 = 3 kΩ, C1 = C2 = 1 μF, C3 = 100 μF, Rs = 10 kΩ. Were measured: the the circuit's current consumption and the voltages in drain, the source and grid of the transistor T.

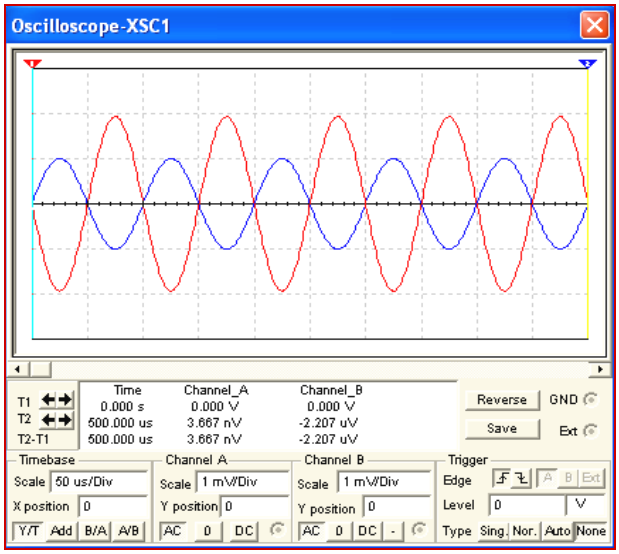

Fig. 12. Signals from the amplifier's input and output with TEC-J in common-source connection resulted further simulation

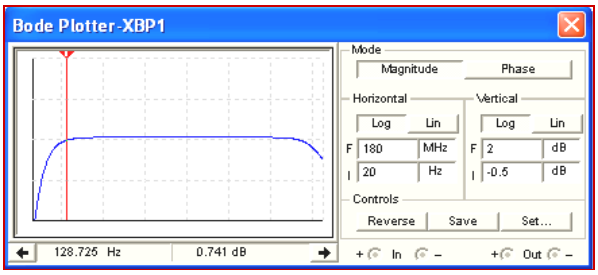

Fig. 13. Amplifier's amplitude-frequency characteristic with TEC-J in common-source connection resulted further simulation

Have been visualized on oscilloscope the signals from the amplifier's input and output with TEC-J in common-source connection (fig. 12). The amplitude–frequency characteristic of this amplifier, resulted further simulation, is presented in fig. 13.

The amplifier with TEC-MOS transistor, repeater-on-source with bootstrap reaction, (Fig. 14), represents an apart amplifier type, used especially as adaption circuit for signal sources with extremely high internal resistance. The bootstrap connection applies by the capacitor C2, which, by the the positive reaction source-grid which introduces it, increases the amplifier's input equivalent resistance (however very high in the presented case).

Resistors R1, R2 form the voltage divider from the grid of the transistor used for its polarization, and the resistor R3, of high value, has the role to ensure a high input resistance to the circuit. The resistor Rs contribute to establishing the drain current of transistor T, having in this case also the role of charge resistance.

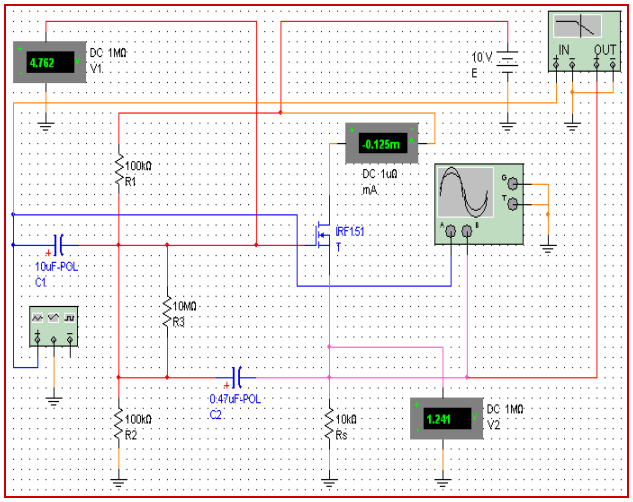

Fig. 14. Amplifier's simulation diagram with TEC-MOS in common-drain connection (repeater-on-source)

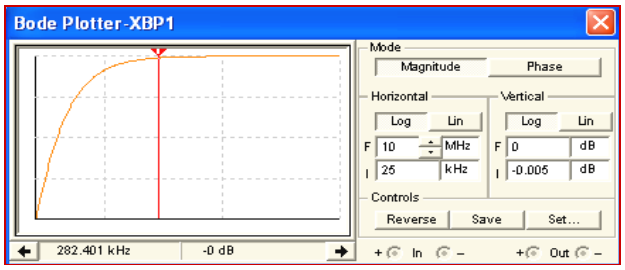

Fig. 15. The amplifier's amplitude–frequency characteristic with TEC-MOS in common-drain connection resulted further simulation

It's been achieved the simulation of this amplifier's operation for the following values of the electronic components from diagram: SV = 100 mV / 10 kHz, E = 10 V, T = IRF151, R1 = 100 kΩ, R2 = 100 kΩ, R3 = 10 MΩ, C1 = 10 μF, C2 = 0,47 μF, Rs = 10 kΩ.

Was measured the circuit's current consumption, the grid voltage and the drain of transistor T. The amplitude–frequency characteristic of this amplifier, resulted further simulation, is presented in fig. 15.

Following the simulation, were visualized on oscilloscope the signals from the amplifier's input and output with TEC-MOS in common-drain connection (fig. 16).

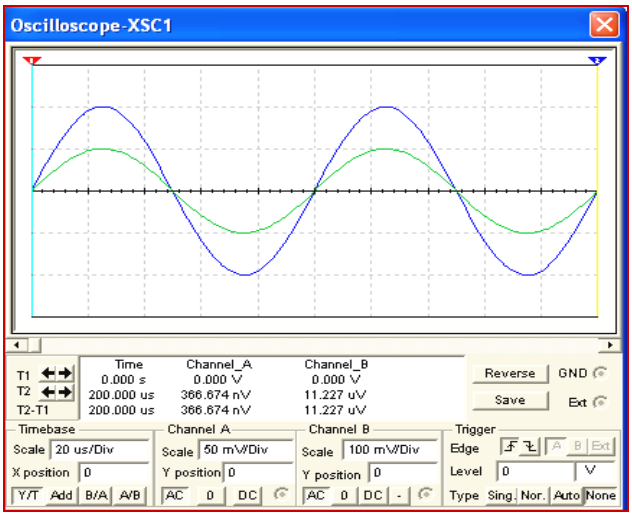

Fig. 16. Signals from the amplifier's input and output with TEC-MOS in common-drain connection resulted further simulation

The cascode amplifier with two TEC-J transistors (Fig. 17) is used especially at high frequencies. Transistor T1 works in common-source connection and transistor T2 in common-grid connection, the coupling between the two transistors being direct. Thus, are ensured the equivalent input and output specific resistances and a high voltage amplification, comparable

with the one of a classic amplifier with two amplifier stages. Resistors R1 and R2 ensure the simultaneous polarization, convenient, of transistors T1, T2.

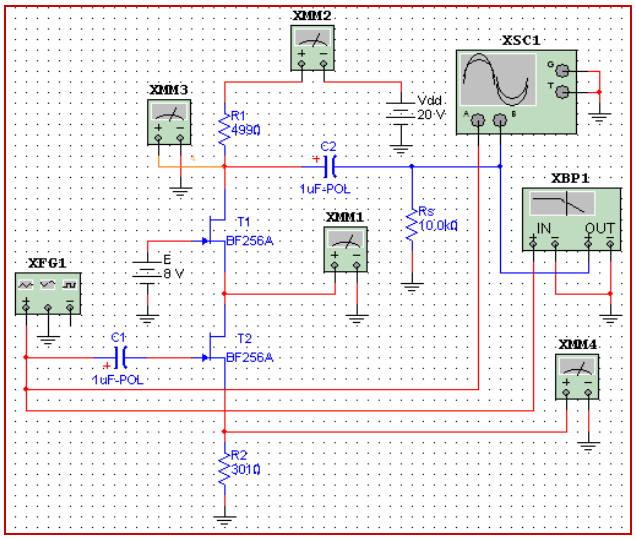

Fig. 17. Simulation diagram of the cascode amplifier with two TEC-J transistors

Capacitors C1, C2 achieve the galvanic separation between the amplifier and the SV signal source (XFG1 functions generator), respectively the charge Rs.

Was achieved the simulation of this amplifier's operation for the following values of the electronic components from diagram: SV = 1 mV/10 kHz, E = 8 V, Vdd = 20 V, T1 = BF256A, T2 = BF256A, R1 = 499 Ω, R2 = 301 Ω, C1 = C2 = 1 μF, Rs = 10 kΩ.

Was measured the circuit's consumption, the voltage in the source and drain of transistor T1, as well as the voltage in the source and drain of transistor T2. The amplitude–frequency characteristic of this amplifier, resulted further simulation, is presented in fig. 18.

In fig. 19 were visualized on oscilloscope the input and output signals of the cascode amplifier with two TEC-J transistors resulted further simulation.

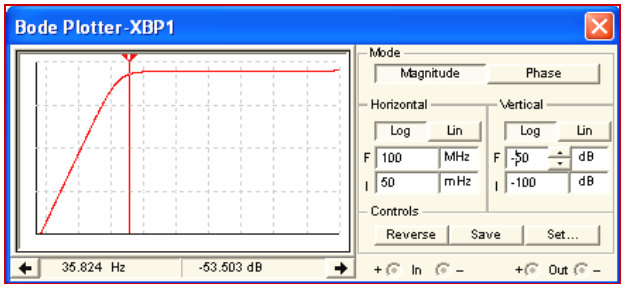

Fig. 18. The amplitude-frequency characteristic of the cascode amplifier with two TEC-J transistors

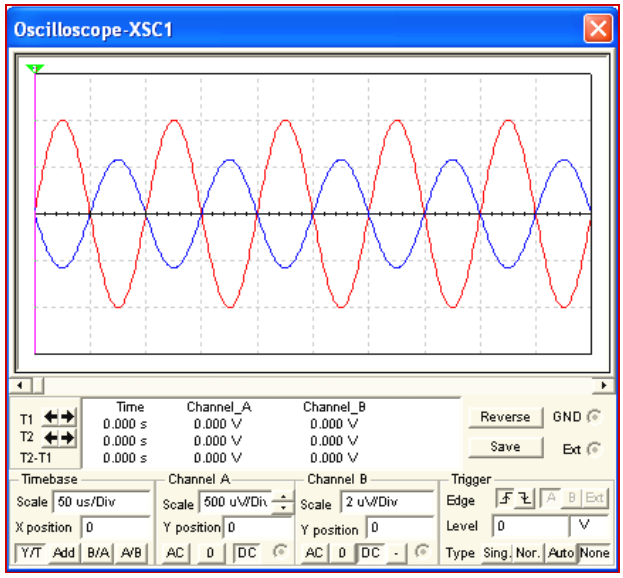

Fig. 19. Signals from the cascod amplifier's input and output with two TEC-J transistors

CONCLUSIONS

Simulation of the low-signal amplifiers' operation with field-effect transistors has a very important role, being the intermediary step absolutely necessary between designing and achievement of the experimental model. Thus, the user can observe by simulation, without being necessary the practical achievement of the electronic circuit, the real behavior and can modify certain components in order to reach the desired result.

After the electronic diagram's achievement, by software can be performed an operational analysiss, as well as the behavior in different duty regimes – d.c., impulses, transitory and stationary regimes , behavior with frequencies, etc – by means of the own measurement and diagnosis systems, as well as the software's specific facilities.

The main advantage offered by the EWB–Multisim 8 simulation program consists in high flexibility as regards the structure modification of the analyzed electronic circuits and their duty regimes, fact which allows an analysis and a diagnosis within a much more reduced time interval of the electronic circuits than the case when these would be physically achieved, allowing in addition a facile and large storage of information about the circuit's operation between different implementation options.

One can notice the time savings and the possibility of further data processing, especially

the graphic dependencies for different measures, by means of the EWB–Multisim 8 program

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AUTHORS & AFFILIATION

[1.] CORINA MARIA DINIŞ,
[2.] CORINA DANIELA CUNTAN,
[3.] GABRIEL NICOLAE POPA,
[4] ANGELA IAGĂR

[1. 2. 3. 4.] DEPARTMENT OF ELECTRICAL ENGINEERING & INDUSTRIAL INFORMATICS,
FACULTY OF ENGINEERING HUNEDOARA,
UNIVERSITY "POLITEHNICA" TIMISOARA, ROMANIA

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Abstract:
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Keywords:
a maximum 10 representative words for the paper

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*The submitted manuscript must be content **INTRODUCTIVE NOTES (INTRODUCTIONS)**, follow by the **METHODOLOGY**, the **PRELIMINARY RESULTS** or the **FINAL RESULTS**, and, in final, the **CONCLUSIONS** about the presented notes.*
*Also, the paper included the **ABSTRACT**, **KEYWORDS**, and **REFERENCES**.*
The conclusions must be clear, relevant and must be indicate some the empirical, theoretical, methodological or scientific aspects of the research, and the author's contributions, or the future preliminaries of our research. It will publish empirical, theoretical and methodological articles.

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Tables and Figures should be numbered, titled and the resource should be mentioned below them. Photographs in the text are preferable to be in black and white, but must be clear, with a high contrast. Under each figure there will be typed, centered, "Figure X. Name of the figure".
Tables will be part of the text, designed as "Table y. Name of the table", written above the table, centered.
The equations will be inserted in the text – left aligned – and will be numbered with Arabian figures, in round brackets, right aligned. Before and after the equation a blank line will be left.

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SCIENTIFIC EVENT

INTERNATIONAL SYMPOSIUM "INTERDISCIPLINARY REGIONAL RESEARCH" – ISIRR 2009 –

HUNEDOARA, ROMANIA, 23 - 24 APRIL, 2009

FINAL CALL ANNOUNCEMENT & REGISTRATION OF THE PARTICIPANTS

*It is our great privilege and pleasure to extend a cordial and sincerely invitation to you and your colleagues to attend the **10th INTERNATIONAL SYMPOSIUM "INTERDISCIPLINARY REGIONAL RESEARCH" – ISIRR 2009 – ANNIVERSARY EDITION**, which will be held in **Hunedoara – Romania**, in **April, 23rd – 24th, 2009**.*

*The **10th INTERNATIONAL SYMPOSIUM "INTERDISCIPLINARY REGIONAL RESEARCH" – ISIRR 2009 – ANNIVERSARY EDITION**, will ensure an exchange of scientific information and didactical opinions in fields with an impressive dynamic considering the research and the technological progress.*

*The SYMPOSIUM will also provide the opportunity for exchanging ideas and experience with our colleagues coming from **HUNGARY**, **SERBIA** and **ROMANIA** and for developing new scientific collaboration.*

KEYWORDS:
Scientific events, Multidisciplinarity, Symposium, Scientific collaborations

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- *Data: THURSDAY, 23RD – FRIDAY, 24th of APRIL, 2009.*
- *The official language at the SYMPOSIUM is ENGLISH, and the papers are accepted only in ENGLISH.*
- *The SYMPOSIUM includes PLENARY SESSIONS, WORK-SHOPS, POSTER PRESENTATIONS, INFORMATIVE and AGREEMENT ACTIONS.*
- *The papers of a high scientific level will be presented during the SYMPOSIUM, while the rest of the papers will have a poster-form presentation.*
- *The papers, classified according to the topics and presented in the SYMPOSIUM sections, are collected in the CD VOLUME PROCEEDINGS.*
- *Also, the selected conference papers will be appear in a special number of the multidisciplinary engineering journal ANNALS OF FACULTY OF ENGINEERING HUNEDOARA – JOURNAL OF ENGINEERING (FASCICULE 4/2009, PRINT VERSION, ISSN 1584-2665).*
- *A selected lot of papers from the SYMPOSIUM sections will be collected in the ONLINE*

SUPPLEMENT of ANNALS OF FACULTY OF ENGINEERING HUNEDOARA – JOURNAL OF ENGINEERING, in the ACTA TECHNICA CORVINIENSIS – BULLETIN OF ENGINEERING.

- *The papers have to frame into topics, to have an interdisciplinary character, and to be at the level of an international symposium.*
- *The selected papers will have to be presented in the SYMPOSIUM sections therefore the presence of one of the authors is required.*
- *The papers must have an interdisciplinary characteristic and to treat themes of mutual interest for our geographical area: eastern HUNGARY, northern SERBIA and western ROMANIA.*
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- *Researchers from other countries may participate as well, on the condition of applicability for their results on the above mentioned geographical areas.*

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METHODS AND TECHNIQUES, INSTRUMENTS AND SUPPLIES IN THE NATURAL SCIENCE FIELDS, *focusing on the theory and practice of chemistry and physics, covering the full spectrum of natural sciences in multidisciplinary studies;*

- ***subSECTION 6.A***

METHODS AND TECHNIQUES, INSTRUMENTS AND SUPPLIES IN THE FIELDS OF CHEMISTRY AND PHYSICS, *focusing on the general chemistry and physics, including the multidisciplinarity in these areas.*

- ***subSECTION 6.A***

METHODS AND TECHNIQUES, INSTRUMENTS AND SUPPLIES IN THE FIELD OF MATHEMATICS, *focusing on the mathematic fields and the application of mathematics in the engineering.*

- ***INFORMATIVE MEETING,***

discussing the topic: ***REGIONAL INTEGRATION****, concerning the expanding of the application area for the transferable credit system between the specialized faculties and universities from HUNGARY, SERBIA and ROMANIA, educational and pedagogical issues common for this countries, as well as problems regarding the extending of connections between the institutions on educational matters, teaching and specializing processes and co-operation between professors and students.*

INVITATION

The SYMPOSIUM is an open invitation for all specialists, professors, researchers and experts in all scientific fields, who can produce a free presentation of the results in their activities. It is preferable for the papers to have an interdisciplinary characteristic and to treat themes of mutual interest for our geographical area: eastern HUNGARY, northern SERBIA and western ROMANIA.

Priority is given to papers produced by a mixed team of researchers from the three countries. Researchers from other countries may participate as well, on the condition of applicability for their results on the above mentioned geographical areas.

For more information please contact the FACULTY OF ENGINEERING – HUNEDOARA, SECRETARY OFFICE OF THE ORGANIZING COMMITTEE.

An e-mail address was be opened to receive your correspondence: redactie@fih.upt.ro

All information on the conference will also be available on the web at http://annals.fih.upt.ro/sustained-events.

SCHEDULE OF EVENTS

1ST DAY, THURSDAY, 23RD APRIL, 2009

08.00 – 10.00 *Welcoming of guests and registration of participants – in the HALL of FACULTY OF ENGINEERING – HUNEDOARA*

10.00 – 11.30 *Opening Ceremony – in the AMPHITHEATRE of FACULTY OF ENGINEERING – HUNEDOARA*

Plenary Lecture # 1
FROM THE RETEZAT NATIONAL PARK TO EUROPE'S "YELLOWSTONE" - SEEDS FOR THOUGHTS FOR THE ESTABLISHMENT AND EFFICIENT MANAGEMENT OF EUROPE'S LARGEST PROTECTED AREA COVERING THE SOUTHERN AND WESTERN CARPATHIANS IN ROMANIA AND SERBIA
Dr. ERIKA STANCIU – WWF DANUBE CARPATHIAN PROGRAMME, CARPATHIAN, FORESTS AND PROTECTED AREA LEADER, RETEZAT NATIONAL PARK PRESIDENT

Plenary Lecture # 2
SUSTAINABLE DEVELOPMENT AND THE ECONOMIC CRISIS
Dr. CARMEN HĂRĂU – UNIVERSITY POLITEHNICA TIMIŞOARA, FACULTY OF ENGINEERING – HUNEDOARA

Plenary Lecture # 3
SLAG – UTILIZATION IN ROAD CONSTRUCTION – EXPERIENCE AND SOLUTIONS
Eng. RODICA ISTRATE – BUSINESS SERVICES PREST SRL HUNEDOARA

Plenary Lecture # 4
ADVANCED TECHNIQUES IN ELECTRON SPECTROSCOPY FOR SURFACE AND INTERFACE STUDIES,
Prof. Dr. BERNARD GRUZZA – POLYTECH'CLERMONT-FERRAND UFR SCIENCES, UNIVERSITÉ BLAISE PASCAL – CLERMONT II CLERMONT-FERRAND, HEAD OF THE RESEARCH GROUP "SURFACES AND INTERFACES", LABORATOIRE DES SCIENCES DES MATÉRIAUX POUR L'ELECTRONIQUE ET D'AUTOMATIQUE , LASMEA, FRANCE

11.30 – 12.00 *Coffee break – in the HALLS of FACULTY OF ENGINEERING – HUNEDOARA*

12.00 – 12.30 *Setting of posters by sections – in the HALLS of the FACULTY OF ENGINEERING*

12.30 – 14.00 *Presentations and debates by sections – in the AMPHITHEATRES of the FACULTY OF ENGINEERING*

14.00 – 16.00 *Break for lunch – in the STUDENT RESTAURANT of the Faculty of Engineering – Hunedoara*

16.00 – 19.00 *Debates by sections – in the Amphitheatres of FACULTY OF ENGINEERING*

19.00 *Festive dinner – in the HOTEL MAIER – HUNEDOARA ****

2ND DAY, FRIDAY, 24TH APRIL, 2009

08.00 – 10.00 *Breakfast – in the HOTEL MAIER – HUNEDOARA *** and in the STUDENT RESTAURANT of the FACULTY OF ENGINEERING – HUNEDOARA*

10.00 – 11.30 *Presentations and debates by sections and posters – in Halls and in Amphitheatres of the FACULTY*

11.30 – 12.30 *Informative Meeting – in the COUNCIL CHAMBER of the FACULTY OF ENGINEERING*

12.30 – 13.30 *Final debates and CLOSING CEREMONY – in the Amphitheatre of FACULTY OF ENGINEERING*

13.30 – 14.00 *Break for lunch – in the STUDENT RESTAURANT of the FACULTY OF ENGINEERING – HUNEDOARA*

14.00 *Visit to tourist sights (CORVIN CASTLE and surroundings)*

PROGRAM SCHEDULE

Faculty of Engineering – Hunedoara
Amphitheatre # 1 – # 6
Group C, Floor 1
Group B, Floor 2
Group F, Floor 1
Presentations and debates by sections

1ST DAY, THURSDAY, 23RD APRIL, 2009
12.30 – 14.00 and 16.00 – 19.00
Faculty of Engineering – Hunedoara
Central Hall # 1 – Group C , Floor 1
Presentations and debates by posters

1ST DAY, THURSDAY, 23RD APRIL, 2009
16.00 – 19.00

2ND DAY, FRIDAY, 24TH APRIL, 2009
10.00 – 12.00

THE INFORMATIVE MEETING

- discussing the topics:

- *REGIONAL INTEGRATION, concerning the expanding of the application area for the transferable credit system between the specialized faculties and universities from HUNGARY, SERBIA and ROMANIA, educational and pedagogical issues common for this countries, as well as problems regarding the extending of connections between the institutions on educational matters, teaching and specializing processes and co-operation between professors and students.*
- *EXTEND AREA OF ISIRR, discussing about the expanding possibilities of the ISIRR in BULGARIA and SLOVAKIA.*
- *ISIRR for ISI PROCEEDINGS APPLICATION, discussing about the possibilities to accede into international databases for recognize the ISIRR as important Symposium in this area.*
- *THE 11th ISIRR, organized in SZEGED, HUNGARY, in preliminary discussions*

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SECRETARY OFFICE
OF THE ORGANIZING COMMITTEE

UNIVERSITY POLITEHNICA TIMIŞOARA
FACULTY OF ENGINEERING – HUNEDOARA
5, REVOLUTIEI,
331128, HUNEDOARA
ROMANIA
phone: + 40 254 207522;
fax: + 40 254 207501
e-mail: redactie@fih.upt.ro

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SCIENTIFIC EVENT

The XIth INTERNATIONAL SYMPOSIUM "YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH"

ISYPMR - 2009

12 - 13 NOVEMBER 2009
TIMISOARA, ROMANIA

ANNOUNCEMENT

The SYMPOSIUM will be organised by the NATIONAL R&D INSTITUTE FOR WELDING AND MATERIAL TESTING – ISIM TIMIŞOARA, ASSOCIATION FOR MULTIDISCIPLINARY RESEARCH (ACM-V), UNIVERSITY "POLITEHNICA" OF TIMISOARA under de aegis of MINISTRY OF EDUCATION, RESEARCH AND INNOVATION.
Specialists from SERBIA, HUNGARY and BULGARIA will participate in the SYMPOSIUM together with the ROMANIAN specialists.
You are invited to participate at the XIth INTERNATIONAL SYMPOSIUM "YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH".

KEYWORDS:
Scientific events, Multidisciplinarity Research, Symposium, Scientific collaborations, Young People

GENERAL INFORMATIONS – AIMS

The aim of the SYMPOSIUM is to create the framework for the presentation, debate and publication of the valuable scientific results obtained by both the young members of ACM-V and from other regions, beside those from SERBIA, HUNGARY and BULGARIA.
The Organization Committee propose that the XIth SYMPOSIUM to be one of high scientific level and quality.
The criteria for the papers' estimation by the Scientific Committee are:

- *interdisciplinary and multidisciplinary technical – scientific character*
- *high scientific level*
- *contribution brought to the solution of the proposed problem and/or development of the field.*

You are invited to participate at the XIth INTERNATIONAL SYMPOSIUM "YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH".
The participants are asked to fill-in and mail the Registration form to the Secretariat of the ASSOCIATION FOR MULTIDISCIPLINARY RESEARCH OF THE WEST ZONE OF ROMANIA (ACM-V) located at TIMISOARA, Bv. MIHAI VITEAZUL nr. 30 and also to mail an abstract of the paper in ENGLISH (200 words at the most) specifying the section.

ORGANIZERS

- *NATIONAL R&D INSTITUTE FOR WELDING AND MATERIAL TESTING – ISIM TIMIŞOARA,*
- *ASSOCIATION FOR MULTIDISCIPLINARY RESEARCH (ACM-V),*
- *UNIVERSITY "POLITEHNICA" OF TIMISOARA*
- *BANAT'S UNIVERSITY OF AGRICULTURAL SCIENCES AND VETERINARY MEDICINE – TIMISOARA*
- *THE LOCAL COUNCIL OF TIMISOARA, TIMISOARA CITY HALL*
- *THE COUNTY COUNCIL OF TIMIS*

under de aegis of

- *MINISTRY OF EDUCATION, RESEARCH AND INNOVATION*

MODEL FOR PAPER'S ELABORATION

- *The paper should contain max. 6 pages, size A4 (with figures and tables included in the text, including bibliography), with an even number of pages;*
- *The paper should be edited on computer with Arial font, 12 pt. on size A4 with useful area of 24 cm × 16 cm (left, right and up 2.5 cm, down 3.0 cm);*
- *The pages should be numbered by pencil;*
- *The papers should be written in Word format;*
- *The title of the paper should be written with capital letters (14 pt. - Bold), centred;*
- *The paragraph title should be written with 12 pt. bold fonts and it might be centred.*
- *Graphic materials should be exposed on transparent slides or Power Point presentation,*
- *The presentation should take 10 minutes at the most*

The paper will be transmitted on CD and listed in one copy.

An author can participate with two papers at the most.

TOPICS

The programme of the Symposium contains papers in Plenary Session on the topic: „PRIORITIES OF THE EUROPEAN SCIENTIFIC RESEARCH"

Papers in sections of the XIth INTERNATIONAL SYMPOSIUM "YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH" will on the following topics:

- *TECHNICAL SCIENCES*
- *CHEMISTRY, PHYSICS AND MATHEMATICS*
- *BIOLOGY, AGRICULTURE AND ANIMAL SCIENCE*
- *HEALTH (HUMAN AND VETERINARY)*
- *ECOLOGY AND ENVIRONMENT PROTECTION*
- *SOCIAL AND HUMAN SCIENCES.*
- *ECONOMIC SCIENCES*

INTERNATIONAL SCIENTIFIC COMMITTEE

- *PROF. DR. AVRAM JECU – MEDICINE AND PHARMACEUTICS UNIVERSITY "VICTOR BABEŞ" TIMISOARA - ROMANIA*
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HONORY PRESIDENT

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PRESIDENT OF THE ORGANISING COMMITTEE

LECTURER DR. ENG. FLAVIU FRIGURĂ ILIASA – UNIVERSITY "POLITEHNICA" OF TIMIŞOARA

REGIONAL ORGANIZING COMMITTEE

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- ASSIST LECT. DR. ENG. DANCI OANA – USAMVB TIMISOARA - ROMANIA
- DIPL. PHYS. FARBAŞ VALERIA – ASSOCIATION FOR MULTIDISCIPLINARY RESEARCH IN THE WEST ZONE OF ROMANIA
- PROF. DR. ENG. GRUNEANŢU IOSIF – UNIVERSITY OF PETROSANI - ROMANIA
- LECT. DR. ENG. IMBREA ILINCA – USAMVB TIMISOARA - ROMANIA
- READER DR. ENG. KISS IMRE – FACULTY OF ENGINEERING HUNEDOARA - ROMANIA
- READER DR. NEGRUŢIU MEDA – MEDICINE AND PHARMACEUTICS UNIVERSITY "VICTOR BABEŞ" TIMISOARA – ROMANIA
- DR. NYARI TEREZIA – NATIONAL R&D INSTITUTE FOR ELECTROCHEMISTRY AND CONDENSED MATTER - ROMÂNIA
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- DR. ENG. ROSU RADU – ISIM TIMISOARA - ROMANIA
- LECT. DR. ENG. RACKOV MILAN – UNIVERSITATEA NOVI-SAD – SERBIA

DEADLINES

The deadline for mailing the abstracts, in which, it will be showed the personal contribution of the authors and the interdisciplinary character: JULY 17TH 2009.

The Scientific Committee will analyse the abstracts and communicate to the authors until the 10th of SEPTEMBER 2009 which are the selected papers, with a view to the final elaboration.

The deadline for mailing of the complete papers, edited according to the annexed model and the CD until: OCTOBER 5TH 2009

The publication in volume or on CD of the papers will be decided by the Scientific Committee following the analysis of the complete papers mailed in time, if these fulfill the technical-scientific criteria and the elaboration mode.

Any correspondence should be addressed to the secretariat of the SYMPOSIUM, located at the ASSOCIATION FOR MULTIDISCIPLINARY RESEARCH (ACM-V). Bd. MIHAI VITEAZUL nr. 30, 300222 TIMISOARA, ROMANIA, Tel. (+40) - 0256 - 491840, Fax (+40) - 0256 – 499149

ISYPMR - 2009

The XIth INTERNATIONAL SYMPOSIUM "YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH"

INFORMATION - CORRESPONDENCE

Any correspondence should be addressed to the secretariat of the Symposium, located at the ASSOCIATION FOR MULTIDISCIPLINARY RESEARCH (ACM-V).
BD. MIHAI VITEAZUL NR. 30,
300222 TIMISOARA, ROMANIA
Tel. (+40) - 0256 - 491840
Fax (+40) - 0256 - 499149
Contact persons:
Mr. Phys. Nicolae Farbaş Ph.D.
E-mail: nfarbas@isim.ro
Mr. Lect. eng. Sorin-Tiberiu Bungescu Ph.D.
E-mail: sobungi@yahoo.com

ISYPMR - 2009

The XI[th] INTERNATIONAL SYMPOSIUM "YOUNG PEOPLE AND MULTIDISCIPLINARY RESEARCH"

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SCIENTIFIC EVENT

9TH INTERNATIONAL SCIENTIFIC CONFERENCE NEW TRENDS IN TECHNICAL SYSTEMS OPERATION 2009

TSO 2009
New Trends in Technical Systems Operation
Conference

5TH – 6TH NOVEMBER 2009
PRESOV, SLOVAKIA

CONFERENCE AIMS

The aim of the ninth conference TSO '09 is to offer a space for information, exchange of experience and the latest scientific knowledge, to contribute actively to forming of development trends in manufacturing technology operation and technical systems and to contribute to an increase of intellectually demanding technical education standards.

PATRONAGE:

CONFERENCE WILL BE HELD UNDER THE PATRONAGE OF

- *NOVÁK - MARCINČIN Jozef, prof., Ing., PhD., DEAN OF FACULTY OF MANUFACTURING TECHNOLOGIES OF THE TECHNICAL UNIVERSITY IN KOŠICE WITH A SEAT IN PREŠOV*
- *HUDACKÝ Ján, Ing., Member of European Parliament, Committee on Industry, Research and Energy*
- *HAGYARI Pavel, JUDr., Mayor of the Prešov Town*

CONFERENCE CHAIRMEN:

FABIAN Stanislav, prof., Ing., PhD., head of Department of Manufacturing Processes Operation

HONORARY BOARD: (in alphabetical order):

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SONNTAG Herbert, prof. Dr. Ing. TFH Wildau (D)
UNGUREANU Nicolae, prof. univ. dr. Ing. North University of Baia Mare (RO)

LOCALITY:

Conference will be held in PREŠOV, the third beiggest town in SLOVAKIA.

TOPICS:

- MANUFACTURING SYSTEMS OPERATION.
- OPERATION STATES DIAGNOSTICS OF MANUFACTURING SYSTEMS – NEW TRENDS AND INNOVATIONS.
- MANUFACTURING SYSTEMS AND PRODUCTS QUALITY AND RELIABILITY.
- MANUFACTURING SYSTEMS CONTROL AND COMPUTER AIDED MANUFACTURING.
- ENERGY ASPECTS OF MANUFACTURING SYSTEMS OPERATION.
- ENVIRONMENTAL ASPECTS OF MANUFACTURING SYSTEMS OPERATION.
- INNOVATION AND CREATIVITY IN MANUFACTURING SYSTEMS OPERATION.

Technical fields application in progressive manufacturing technologies, metal die casting technology, and injection moulding are welcomed.

INTERNATIONAL SCIENTIFIC PROGRAMME COMMITTEE: (in alphabetical order):

ORGANIZING COMMITTEE:

General Secretary: KRENICKÝ Tibor, RNDr., PhD. TU Košice (SK)

MEMBERS:

RIMÁR Miroslav, assoc. prof., Ing., CSc. TU Košice (SK)
SKOK Peter, assoc. prof., Ing., CSc. TU Košice (SK)
STRAKA Ľuboslav, Ing., PhD. TU Košice (SK)
ULIČNÝ Andrej, Ing. TU Košice (SK)

CONTACT:

JOZEF DOBRÁNSKY, PhD., MSc.
TIBOR KRENICKÝ, RNDr., PhD.
DEPARTMENT OF MANUFACTURING PROCESSES OPERATION
FACULTY OF MANUFACTURING TECHNOLOGIES OF THE TECHNICAL UNIVERSITY IN KOŠICE
with a seat in Prešov
Štúrova 31, 080 01 Prešov, SLOVAK REPUBLIC
tel: +421-51-7723504, fax: +421-51-7733453
Email: tso.fvt@tuke.sk

CONFERENCE INFORMATION UPDATE:

All needed information about conference can be found in:
www.tuke.sk/fvtpo/tso2009

SHEDULE AND DEADLINES:

Application and paper annotation: MAY 30, 2009
Acceptation notification comments: JUNE 5, 2009
Print-ready contributios (PDF + Word) by e-mail: OCTOBER 10, 2009
Early registration deadline: SEPTEMBER 30, 2009
Conference TSO '09, PREŠOV, Slovakia: NOVEMBER 5 - 6, 2009

9TH INTERNATIONAL SCIENTIFIC CONFERENCE – NEW TRENDS IN TECHNICAL SYSTEMS OPERATION 2009

TSO 2009
New Trends in Technical Systems Operation
Conference

organized in:

EUROPEAN YEAR OF INOVATION AND CREATIVITY

by:

DEPARTMENT OF MANUFACTURING PROCESSES OPERATION, FACULTY OF MANUFACTURING TECHNOLOGIES, TECHNICAL UNIVERSITY OF KOŠICE WITH A SEAT IN PREŠOV

in cooperation with

REGIONAL ADVISORY AND INFORMATION CENTER PREŠOV,
SLOVAK MECHANICAL ENGINEERING SOCIETY ZSVTS, BRATISLAVA,
EUROPEAN INFORMATIONAL CENTER SK 673,
CITY OF PREŠOV

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ACTA TECHNICA CORVINIENSIS
BULLETIN OF ENGINEERING

SCIENTIFIC EVENT

1st CONVEEESH
INTERNATIONAL CONFERENCE ON ENGINEERING, ENVIRONMENT, ECONOMIC, SAFETY & HEALTH
&
10th SENVAR
INTERNATIONAL SEMINAR ON ENVIRONMENT & ARCHITECTURE
SCIENCE & ENGINEERING FOR BETTER LIFE
26 – 27 OCTOBER 2009
MANADO, INDONESIA

ORGANIZED BY:

Faculty of Engineering, Universitas Sam Ratulangi, Manado in Indonesia at the celebration of 45th Anniversary of Establishing the Faculty of Engineering

AIMS:

Sustainable development is one the key issues for modern society and requiring new ideas to advance the technologies and strategies currently in use. The main fields, which are the focus of many research efforts, are engineering, ecosystems, planning sustainability and many others. These and others aspects are the focus of the presentation and discussions that will be carrying out at the Conference.
The way in which our society exists, operates and develops is strongly influenced by the way in which sustainable development is applied and implemented. No function in sustainable development can be created without sufficient knowledge, and without sustainable development there can be no innovation on which the existence of modern society depends. However, this international Conference will focus on topics related to Sustainable Development in Engineering, Ecology, Ecosystems, Economics and Planning.

CONFERENCE TOPICS:

ARCHITECTURE
- *Indoor Comfort (Thermal, Light, Sound)*
- *Green Building/ Green Architecture*
- *Traditional & Vernacular Architecture*
- *Energy Efficient Architecture*
- *Waterfront Architecture/ Coastal Architecture*
- *Healthy & Convenience Living Space*
- *Smart Building*
- *Bioclimatic Architecture*
- *Role of Architectural Education in Sustainable Development*

TOWN PLANNING, HOUSING & REGION DEVELOPMENT
- *Ecological Coastal Planning*
- *Disaster Management*

- *Energy Efficient City*
- *Low-Cost & Healthy Housing*
- *Landscape & Townscape for Urban Sustainability*
- *Traditional Settlement & Cultural Heritage*
- *Rural Development*
- *Tourism Management*
- *Outdoor Comfort*

CIVIL ENGINEERING & INFRASTRUCTURE

- *Coastal Engineering*
- *Ecological Construction Material*
- *Construction Management & Work Safety*
- *River Management & Engineering*
- *Urban Electricity & Telecommunication System*
- *Urban Fire Safety Management*
- *Urban Drainage Engineering*
- *Traffic Management & Safety*
- *Road Engineering*
- *GIS, Remote sensing & Geo-mapping*
- *Soil science, Geotechnical & Underground Construction*

ENVIRONMENTAL SCIENCE & PUBLIC HEALTH

- *Governmental Policy in Climate Change & Global Warming*
- *Waste Management (re-use, reduction & recycling)*
- *Pollution Control Technology*
- *Urban Pollution & Health effects*
- *Environmental Education*
- *Environmental Impact Assessment Models*
- *Ecosystems analysis, Ecotoxicology and protection for the living environment*
- *Environmental economics*
- *Ecosystems analysis, Ecotoxicology and protection for the living environment*
- *Environmental economics*
- *Environmental Management, Restoration & Legislation*

MECHANICAL ENGINEERING

- *Ergonomics /Biomechanics*
- *Renewable Energy*
- *Automatic/ Robotic*
- *Energy Conversion Technology*
- *Refrigeration & Air Conditioning*
- *Industrial Management & Processing*
- *Applied Computational Fluid Dynamics (CFD)*
- *Material Properties & Durability*

ELECTRICAL ENGINEERING

- *Hydro electric technology*
- *Photovoltaic Technology*
- *Expert System*
- *Lighting Technology*
- *Electricity Forecasting*
- *System Stability, Analysis & Protection*
- *Power Plants technology & management*
- *Economic Evaluation of Power Systems and Utilities*
- *Informatics Technology*

IMPORTANT DATES:

Deadline for Abstract submission 20 Aug 2009
Reply to Authors for Abstracts acceptance 31 Aug 2009
Full paper submission 10 Sep 2009
Reply to Authors with reviewer's comments 20 Sep 2009
Final paper submission 30 Sep 2009
Conference date 26-27 Oct 2009

INSTRUCTION TO AUTHOR:

An abstract should consist of 250-300 words, and the author should state the objective, theoretical framework, methodology, data sources, results, and applications in his/her paper.
Please write your name (s), affiliation (s), address (es), phone, fax, e-mail address at the end of the page.
Full Papers of not more than 14 pages, singled spaced with Times New Roman Font 10 (2.5 cm all margins) should reach the Technical Conference Chair not later than 10, September 2009. All the papers presented at the conference will appear in the proceedings. CD-ROM and abstracts will be distributed to the conference participants.

BENEFITS OF ATTENDING:

The conference will be of interest to planners, environmentalists, engineers, architects, ecologist, economists, policy makers and other governmental officials, researchers and academics involved in the field of the sustainability. However, attending this conference will benefit you as follows:

- *Keep up to date with the latest advances in the field.*
- *Present your research within a unique forum.*
- *Collaborate with experts from around the world.*
- *Your conference paper will be reviewed by members of the committee and other colleagues and best quality of the papers will be selected for publication in the JOURNAL OF ARCHITECTURAL, SCIENCE, URBAN SETTLEMENT AND ENVIRONMENT, ISSN 1858-1137. Dr. Aristotulus E. Tungka (matrasain@yahoo.com), the EDITOR-IN-CHIEF, will be in charge of the communication with the members of the international Scientific Committee and authors.*
- *Participants who presented papers at **CONVEEESH'09** conference will be considered for waiving their fees in the up-coming events of **CONVEEESH' 2011**.*

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SUBMISSION:

An abstract should consist of 250-300 words, and the author should state the objective, theoretical framework, methodology, data sources, results, and applications in his/her paper. Please write your name (s), affiliation (s), address (es), phone, fax, e-mail address at the end of the page.
Full Papers of not more than 12 pages, singled spaced with Times New Roman Font should reach the Technical Conference Chair not later than 10, September 2009. All the papers presented at the conference will appear in the proceedings. CD-ROM and abstracts will be distributed to the conference participants.
All professionals, environmentalists, researchers, and policy makers involved or interested in the area of the conference are invited to present papers relating to the conference topics. Authors are requested to submit abstracts, preferably by e-mail as a Word File attachment to the Technical Conference Chair (E-mail: naser_elamroni@yahoo.co.uk), by not later than August 20, 2009.

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