

## STUDY OF THE SOLIDIFICATION PROCESS FOR METAL FLUIDS IN A DYNAMIC FIELD

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*În lucrare este analizată posibilitatea tratamentului materialelor metalice lichide și cristalizarea acestora în câmp energetic piramidal.*

*Pentru a demonstra existența efectului de piramidă, am încercat evidențierea acestuia prin două metode: 1- prin măsurare cu ajutorul unor aparate, pentru a observa existența undelor din piramidă, 2- prin modificarea structurii cristaline a materialelor metalice, prin turnarea în piramidă a unor probe. Testele au fost făcute pe 4 materiale metalice, în piramidă și în exteriorul ei, pentru a avea o probă martor.*

*The this study presents the possibility of new technique applied to fluid metals and their crystalline structure under the effect of the energetic field of the pyramid.*

*There are two significant methods used to demonstrate the existence of the pyramid's energetic field: 1-measurement techniques using different devices that demonstrate the existing waves inside the pyramid; 2-modification of crystalline structure by casting several samples inside the pyramid. The experiments were made on 4 metals, inside and outside the pyramid to obtain models for further comparison.*

### 1. Introduction

Modern technologies for obtaining casting parts are based on physical and mechanical treatment techniques applied to alloys in a molten condition during crystallizing and solidification processes.

In this study the following main physical and mechanical treatment techniques, experimented during the flow of fluid metal and the crystallising processes, are presented: - mechanical stirring[1], - mixing pulsing treatment[2], - electromagnetic stirring[3], - ultrasounds treatment technique[4].

This study presents a new technology regarding physical and mechanical treatment techniques for metallic fluids in a dynamic system: the vibration inside the energetic pyramidal field. The physical and mechanical treatment techniques, conducted during cast processes and crystal structure solidification, lead to: the decreasing of hydrodynamic limit, thermal and diffusion limit, which intensifies the heat transfer process, eliminates the surface limit section disposal from the contact with the solidification field. They also help the decrease of the two phases

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area width, increase the solidification velocity and finally provide the grain refinement and better physical and mechanical proprieties.

The last chapter of this study presents the fluid metal treatment during the crystallizing process under energetic pyramidal field. Two methods were used: measurement by means of devices in the pyramid and experiments performed inside the pyramid, which present modification of both metal material crystalline structure and properties due to the pyramid waves contribution in the casting process.

## 2. Experiments and measurements related to metal fluids treatment under pyramid effect

### 2.1. Theories about the pyramid's properties

The display of pyramidal energy is based on some important elements. There are several theories related to the pyramid properties and effects such as: 1. pyramid sizes, objects and bodies emissions the form and inclination of the pyramid sides [5], 2. the influence of Hartmann network, orientation towards the earth magnetic poles[6], 3. the extraterrestrial electromagnetism[7], 4. terrestrial magnetism[8], 5. multiple energies[9], 6. etheric vortex[10], 7. microwave resonance[11], 8. cosmic lenses[12], 9. nonelectromagnetic radiations[13], 10. body's radiations[14].

### 2.2. Measurements for the inside pyramid's waves

The measurements inside the pyramid revealed the existence of the ultrasonic waves (Fig. 1), microwaves (Fig. 2), as well as the ionization type gamma waves which can influence the metal materials solidification by radiation. The following values of 19 kHz, 28 kHz, and 56 kHz of the ultrasonic waves can appear due to the existence of native quartz crystals. The ultrasonic waves are generated only in the presence of the quartz crystals.

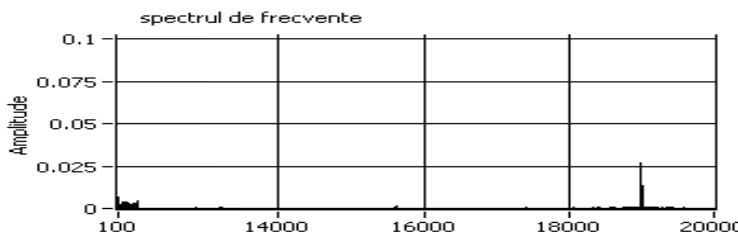


Fig. 1. Measurements are made in the presence of the quartz at a 2/3h level, a 19 kHz waves and a 0,03  $\mu$ m amplitude are generated.

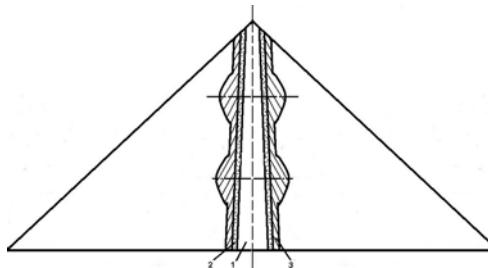


Fig. 2. The confirmation of the microwaves existence inside pyramid by measurements.

The measurements inside the pyramid were made by use of a wave spectral analysor with extremely huge values (gigahertz), precisely up to 5 GHz. During measurement harmonic waves of 1,5 GHz, 3 GHz, 4,5 GHz developed. There were areas with three harmonic frequencies, such as: 1- in the center 4,5 GHz, 2 - middle 3 GHz, and 3 - on the limit 1,5 GHz.

Gamma waves measurements inside the pyramid using Geiger-Müller apparatus, were accomplished in three different places. The results were identical. It was obtained a value of 0,05  $\mu$ Sv/min which would be the equivalent for: 26,28 mSv/year.

The radiation background should not exceed 0,01  $\mu$ Sv/min. The admitted limit value of radiation for persons at the working site is 50 mSv/year and for the rest of the population the maximum value is 5 mSv/year.[2].

Beta waves measurements inside the pyramid using Geiger-Müller apparatus, were accomplished also in three different places. The results were identical. It was obtained a value of 0,085  $\mu$ Sv/min which would be the equivalent for: 44,676 mSv/an. The radiation background is 0,045  $\mu$ Sv/min which would be the equivalent for 23,652 mSv/an.

### 2.3. Experiments connected to the crystals modifications of the metal materials cast inside the pyramid

#### 2.3.1. The experimental pyramid construction

For the experiments, more materials were chosen: zinc, aluminium, copper and the grey cast iron. This choice was made to find out what the energetic consequences are on more metals solidification under different circumstances than normal. The pyramid was made of steel pipe with a 2,5 mm width (OL37,  $\Phi$  22). The pipe was cut at a 1,40 m length for the edge and for the border are 1,60 m.

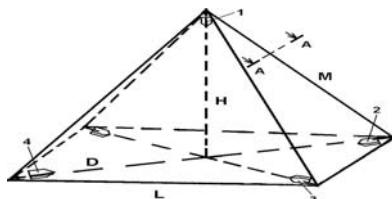


Fig. 3. The pyramid assembly and sizes:  $L = 1,60\text{m}$ ,  $H = 0,85\text{m}$ ,  $M = 1,40\text{m}$ .  
1, 2, 3, 4 – quartz cristals.

Corresponding to the 4 edges, 4 pipes with identical length were cut and also 4 equal pipes for the borders were cut. The tubes were cut in relation with the 45 degrees of the pyramid exterior. Thus the pyramid's height is 0,85 m (Fig. 3).

#### Section A-A

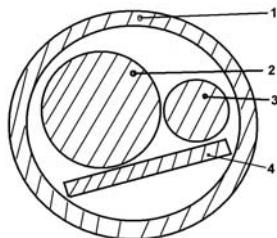


Fig. 4. The pyramid assembly and the pipe content:  
1- steel pipe, 2 – copper wire, 3 – graphite bar, 4 – slide of the stainless steel sheet.

Inside the tube are the other elements introduced: the stainless steel strap, the copper wire and the graphite bars (Fig. 4.)

#### 2.3.2. Cast technology

The same method for all materials was used: direct slurry, bulk liquid pouring in open mold. Only for zinc, the pouring was in a metallic mold for us to notice the difference when the metallic mold is cooled.

The size and the molds used for the three stages are shown in Fig. 5.

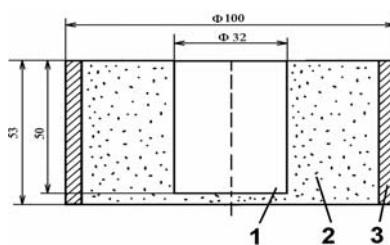


Fig. 5. The mold used for casting and its sizes : 1 – sample, 2 – mixture, 3 – metallic mold.

The pouring was accomplished in the same period of time with both samples and one of the casting tests inside the pyramid. The pouring temperature was:  $Fc - 1400^0 C$ ,  $Al - 710^0 C$ ,  $Cu - 1120^0 C$  and  $Zn - 500^0 C$ . The pouring time was the same for all experimental parts, 7 s. There was a small difference in pouring time periods between two tests, the pilot test and the test inside the pyramid, and that difference was of 10-15 s.

The series of tests were performed for the sake of repeated results and the same casting parameters conditions were kept.

### 2.3.3. The cooling for cast samples

One of the tests was performed by using melt aluminium that was poured into two sand filmed molds. These molds were provided with a thermocouple each who checked the temperature variation for each sample, about 2500 seconds, each second, of a computer (Fig. 6).

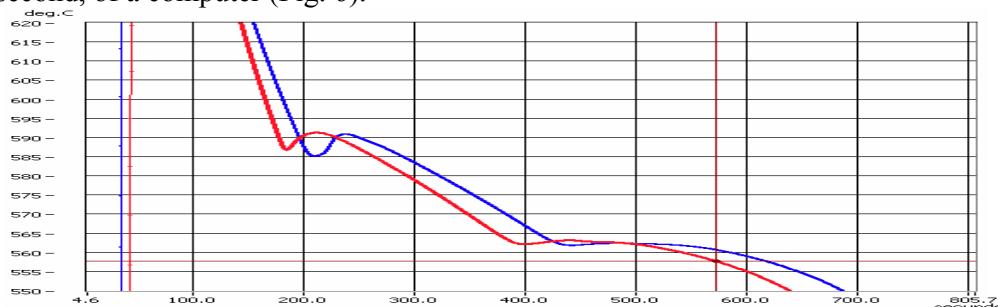


Fig. 6. Aluminium alloy cooling curve, by comparation: the experiment outside of the pyramid (red colour), the experiment inside of the pyramid (blue colour)

From our calculation, the cooling rate for the tests is:

$$\Delta t = t_{tsp} - t_{tse} = 798,3 \text{ s} - 737,5 \text{ s} = 60,8 \text{ sec. slower in pyramid} \quad (1)$$

and :  $t_{tsp}$  - the cooling temperature for the test inside the pyramid,

$t_{tse}$  - the cooling temperature for the test outside the pyramid.

In the following Fig. 7 - 8, sections from the two aluminium cast experiments are presented, inside Al 3, and outside the pyramid Al 2.



3 inside the pyramid : a. macrostructure (1:1);  
b. microstructure of the edges (x100); c. microstructure in centre.

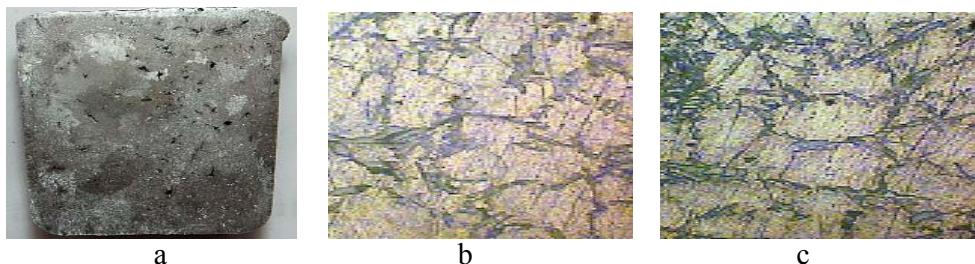


Fig. 8. Section Al 2 outside the pyramid : a. macrostructure (1:1);  
b. microstructure of the edges c. microstructure in center (x100).

Hardness [HB]: Sample Al 2, out of pyramid, (edges) = 55; 56; (centre) = 67; 66;

Hardness [HB]: Sample Al 3, inside the pyramid, (edges)=73; 76; (centre)=67; 71;

The hardness force is greater at the edge and lesser in the centre for the cast experiment inside the pyramid, for Al 3, in Fig. 7. b. and c. and the sections shows the grain elongation.[4].

### 2.3.4. Cast experiments inside the pyramid-mechanical tests

Three different experiments with different periods of time but identical cast conditions were carried out. Most of the parameters were unchanged so as to observe the phenomenon repeats and the results remains unmodified. The test were performed on three levels of the pyramid's height – level: 0, 1/3, 2/3, in order to demonstrate the most obvious effect. For three materials: copper, grey cast iron and zinc, the results proved an improvement for the mechanical properties (aprox. 5-25% higher), as well as modifications in the solidification grain structure.

Aluminium alloys as they were experimented and checked and there was no obvious difference in the solidification structure. But if the aluminium alloys is cast under different conditions such as higher temperatures as in the test conducted at  $900^0$  C or other test at  $790^0$  C, modifications in the solidification

structure are obvious. This phenomenon is explained by the aluminium's much higher latent inner heat, a lot different from the other tested materials.

In the below tables 1 - 5, the results of the mechanical tests inside and outside the pyramid, are shown and could be easily compared. The modifications of the physical characteristics under the pyramid's effect are connected to the tested metallic materials properties.

The test inside the pyramid show that the mechanical properties are higher than the mechanical properties of the tests outside the pyramid, the only exception being the aluminium alloy.

The stage experiments:

Tabel 2.1.

**Mechanical tests for zinc samples**

Samples no.	F <sub>c</sub>	R <sub>c</sub>	F <sub>m</sub>	R <sub>m</sub>	E%	Hardnes [HB]
3-pilot	60	48	70	56	2	c=44,1 e=37,3
1-metallic form pilot	65	50	70	58	1,9	c=45,7 e=33,9
0-lev.0	100	80	110	88	3	c=52,1 e=49,6
II-lev.1/3	105	85	110	88	3	c=50,5 e=48,8
2-lev.2/3	105	85	112	86	3	c=49,6 e=46,7
4c- lev.1/3q	95	75	100	80	2	c=46,9 e=45,4
3-lev.2/3q	105	85	112	86	2,9	c=50,7 e=49,8
0-lev.0 set 2	107	88	118	92	3	c=45,9 e=49

Tabel 2.2.

**Mechanical tests for gray cast iron samples**

Samples no.	F <sub>c</sub>	R <sub>c</sub>	F <sub>m</sub>	R <sub>m</sub>	E%	Hardness [HB]
3-pilot	180	144	200	160	0.6	e=167 c=168,5
1-lev.0	188	151	205	166	1.2	e=174 c=175
5-lev.1/3	205	175	210	190	1.5	e=175 c=175,5
2-lev.2/3	200	160	220	176	1.3	e=193 c=186
0-lev.0.q	177	143	200	160	0.6	e=153 c=157
7-lev.1/3.q	177	143	200	160	0.6	e=154 c=157
4-lev.2/3.q	185	150	200	163	0.6	e=167 c=166

F<sub>c</sub> - the solid flow force, F<sub>m</sub> - the breaking force, R<sub>c</sub> - the resistance to the solid flow; R<sub>b</sub> - resistance to breakage [N/mm<sup>2</sup>]; E[%] - elongation; KV - resilience; q - quartz; P<sub>s</sub> - pilot sample; e - edges; c - centre, lev. - level.

Table 2.3.

**Mechanical tests for aluminium alloy samples**

Sample no.	F <sub>c</sub>	R <sub>c</sub>	F <sub>m</sub>	R <sub>b</sub>	E[%]	Hardness [HB]
6-pilot	165	132	170	136	3	e=45,9 c=50,7
1-lev. 1/3	130	102	135	108	2	e=48,9 c=43,1
3-lev. 0	132	104	138	110	2	e=45,3 c=52,7
2-lev. 2/3	135	104	137	110	2	e=46,3 c=45

Second row of tests:

Table 2.4  
Mechanical tests for copper samples

Sample No.	Fm [N]	Rb [N/mm <sup>2</sup> ]	E [%]	KV [J]	HB - 5/250/15``
Cu - m	20	30.0	1	7	e=65,5 c=67,5
Cu 1- Φ10	80	71.9	6	9	e=89 c=91,1
Cu 2- Φ10	50	38.2	4	8	e=88 c=88.2
Cu 3 - Φ10	40	35.4	2	8	e=85 c=85.2

The conclusion is that some metallic materials change when reaching crystallization temperature like: copper, zinc, gray cast iron, while others do not, as the aluminium.

### 2.3.5. Pyramid cast samples – sections

Each sample has been sectioned and then the macro and microstructure images and the mechanical tests were carried out.

**The cast iron** samples are: Fig. 9 shows the section of the Fc 2 sample, cast at 2/3 pyramid height level.

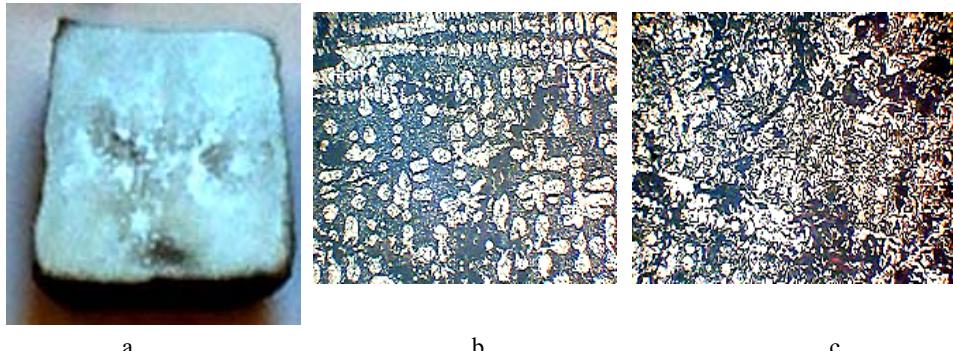


Fig.9. Fc 2 section, macrostructure; b. microstructure of the edges; c. center microstructure.

Fig. 10 shows the section of the Fc 3 pilot sample.

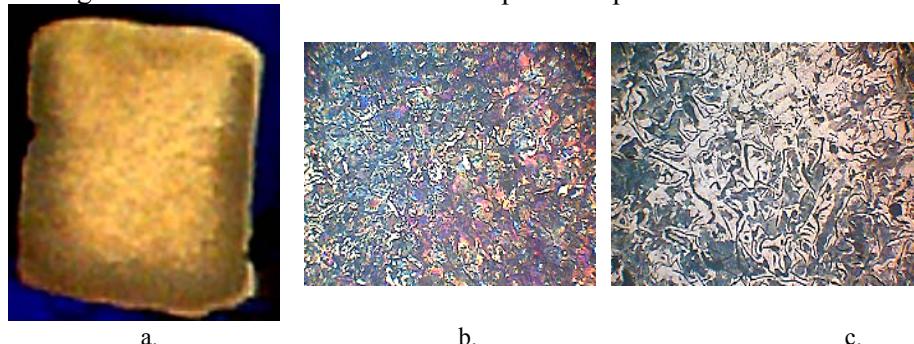


Fig. 10. Fc 3 pilot samples section, sample cast by the pyramid, a. macrostructure; b. microstructure of the edges; c. center microstructure.

Table 2.5.  
Structures obtained on Fc 2 sample – 2/3 h. height level

Structure	Dimensions
Graphite separation shape	lamellar – Gf 6
Graphite separation type	even distribution and thickness, isolated – Gr 7
Graphite separation length	between 75 – 100 $\mu\text{m}$ – Gl 4
Graphite separation area	between 5 – 10 % - G12
Structure type of the basic metallic mass	globular perlite Gp
Perlite dispersion degree	between 0,3-0,6 $\mu\text{m}$ , fine lamellas- Pi 1,2
Separation type of phosphorous eutectic	frequent small separations – Er 12
Hardness	m - 193 HB, c - 186 HB

Table 2.6.  
Structures obtained on pilot sample – Fc 3

Structure	Dimensions
Graphite separation shape	lamellar – Gf 1,2
Graphite separation type	even distribution and thickness, isolated
Graphite separation length	between 125 – 250 $\mu\text{m}$ – Gl 5
Graphite separation area	between 5 – 10 % - G 2-3
Structure type of the basic metallic mass	Globular perlite Gp
Perlite dispersion degree	between 0,3-0,8 $\mu\text{m}$ , fine lamellas -Pi 0,6
Separation type of phosphorous eutectic	frequent small separations – Er3
Hardness	m - 167 HB, c - 168,5 HB

The characteristics of the cast iron samples show the length of the graphite separations is the same at the duplicate sample as well as at the samples: 2c, 1c and 2, (125-250  $\mu\text{m}$ ), and it is smaller in the case of the pyramid cast samples. The sample with the highest levelling between the edges and the center (the difference is 9 HB) is sample Fc 3, cast at level 2/3 h. Sample Fc 1 shows the highest difference in hardness, 45 HB. The highest hardness, of 236-281 HB occurs at level 0 h, where the finest graphite lamellas appear, and the mechanical properties are the highest.

The zinc tests are:

Fig. 11. also shows a pilot sample, Zn1, the one cast in metal form.

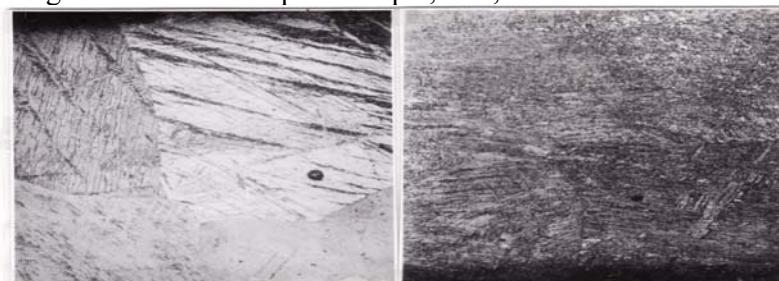


Fig. 11. Zn 1 sample, a. Microstructure of the edges, b. center microstructure.

Fig. 12. shows sample Zn 0, pyramid cast at level 0.

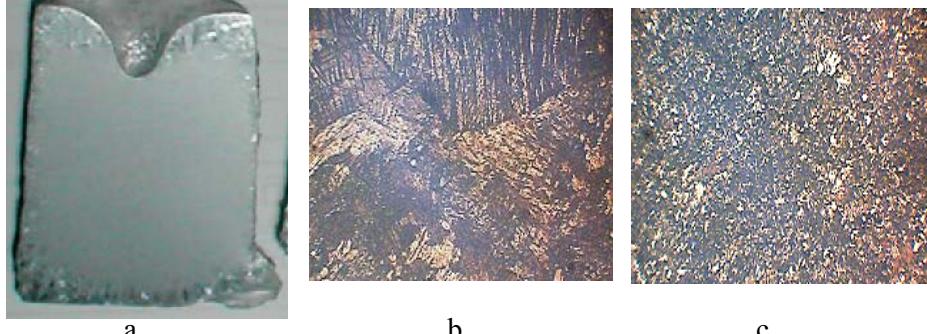


Fig. 12. Sample Zn 0, a. section, macrostructure b. microstructure of the edges, c. center microstructure.

Zinc cast samples show the following characteristics:

- at levels 0 and 2/3 h the columnar area of the lateral sides decreases, generating an additional thermal unrest which does not allow the development of columnar crystals, as the lateral side is the thinner side, where the cooling occurs faster;
- hardness decreases from the center towards the edges in all samples, at all levels;
- compactness increases, the difference between the center and the edges in the duplicate sample is of 7-11 HB, while in the pyramid samples is of only 2-3 HB;
- the characteristics of all the pyramid samples are superior to those of the duplicate samples by 66-75%;
- the best response when it comes to mechanical properties is at level 0.

**The copper tests are:**

Fig. 13. shows the cast Cu pilot sample.

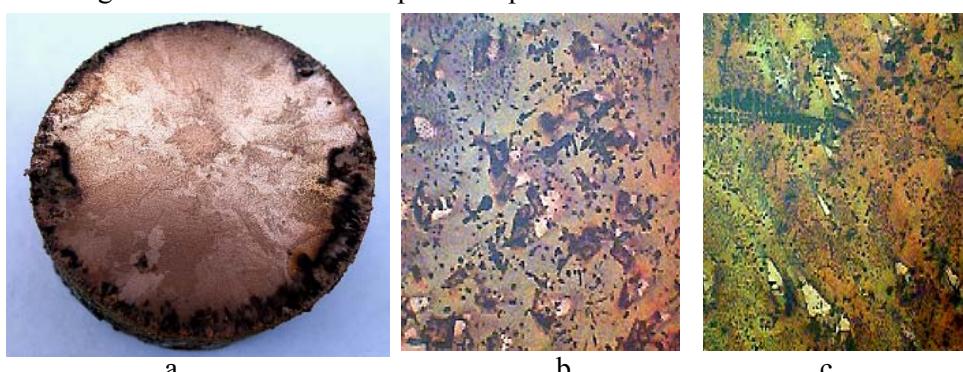


Fig. 13. Cu pilot sample a. section, macrostructure, b. microstructure of the edges, c. center microstructure.

Fig. 14. shows sample Cu 1, pyramid cast at level 0.

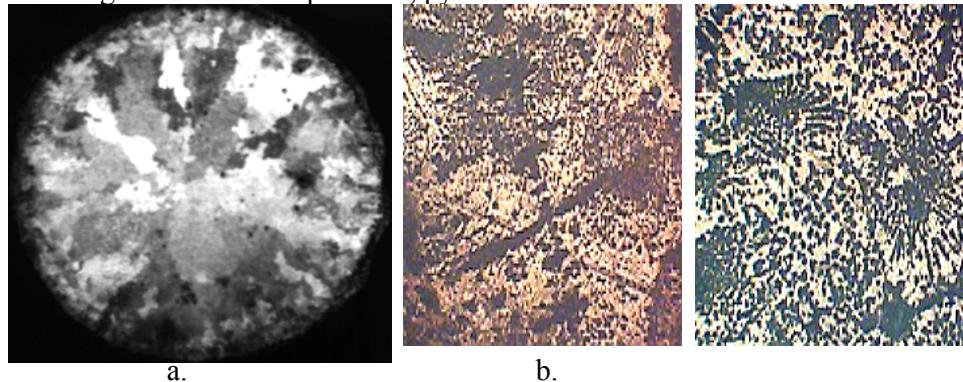


Fig. 14. Cu 1, a. section, macrostructure, b. microstructure of the edges, c. center microstructure.

Copper samples respond well to this energetic treatment, with respect to breakage force, resistance to breakage, resilience or hardness, compared to the duplicate sample. Cu1 sample, cast at level 0 h, stands out, as its breakage and force resistance are twice higher than the one of the duplicate sample. The elongation is highly increased, and the other characteristics, such as hardness and resilience, are also higher. Where the structure is concerned, a crystal decrease can be noticed in the pyramid cast samples, compared to the duplicate sample.[5].

### 3. Conclusions

Approximately 50 cast samples have been carried out, at various heights of the pyramid, with the four metals mentioned above, either in the presence or absence of native quartz crystals, sectioned, and submitted to mechanical tests. Also about 30 wave measurements have been conducted, in different places and under different circumstances, in order to notice any changes in the outcome of samples or measurements.

The measurements show that between the top of the pyramid and its center there is a complex wave of electromagnetic and mechanical type, a spiral, microwave and ultrasound respectively, and also a gamma and beta radiation, made of a few frequency bands to which each metallic material responds resonantly and differently, at each level.

Aluminium alloys show changes in the structure and mechanical properties only at a melting temperatures of  $900^0\text{C}$ , while no changes occur at casting temperatures of  $710^0\text{C}$ .

The particle chooses its own vibration frequency depending on resonance, from a few existent waves and it oscillates according to the respective wave.

The ultrasonic wave seems to have a knot in the center of its base, and the results and calculations show the wave is stable. Other levels show wave venters, constantly oscillating, which explain the anomalies in the outcome of the samples.

Measurements show that electromagnetic waves (microwaves) at 1/3 height level are of higher intensity than the ones at level 0 or level 2/3.

Measurements also show that ultrasounds are of higher amplitude at 2/3 height level.

The pyramid behaves like a lens and an antenna in the same time, concentrating and amplifying certain waves, depending on the materials used for its production. Thus, due to the gamma and beta radiation amplified by the pyramid, iron and nickel begin to oscillate and their magnetostrictive characteristics produce ultrasounds that may be amplified by the quartz crystals placed in the corners of the metallic construction.

The existent quartz crystals do not enter in a phase with the electromagnetic wave (microwaves), thus diminishing the characteristics of the pieces (it can be noticed in the aluminum samples). In order to amplify them one must identify a quartz crystal with a frequency of 30 kHz, 45 kHz, or the harmonics of these frequencies.

The pipes will thus act as waveguides, and will make the microwave radiation of the cosmic background that flows through them coherent. The phase difference between the now coherent and interfering microwaves, which are produced by the pipes, generates an inharmonic spectrum of microwaves. Through shock wave vibration of the atomic loading they produce a secondary radionic ionized scalar emission (according to T.E.S).

Compared to other procedures of solidification control, the agitation of liquid metallic materials in pyramidal field favors the selective crystallization of some metallic materials, depending on the energy and frequency of the waves present in this metallic construction. The classical spent energy is practically null, the metallic construction is cheap, easy to build and the investment can easily be recuperated.

Research of the proposed solutions may be carried further so that it can be put into practice in the industrial field.

The main personal contributions may be synthesized as follows:

1. Performance of an in depth study on the phenomena which occur within the alloys submitted to a treatment under the influence of pyramid energies;
2. The metallic construction is built from a combination of materials that has never been used until today: steel bar, copper wire, stainless steel band, and a graphite band;
3. This pyramid's slope of the lateral sides is different from the one which is known and has been used until today, respectively  $45^\circ$ ;

4. Measurements have determined the presence of ultrasonic waves along the height of the metallic construction, in the presence of quartz crystals;
5. Measurements have shown the presence of microwaves along the height of the pyramid, which confirms the vortex theory, as well as the existence of microwaves;
6. Existence of three layers of microwaves has been determined, which affect materials differently, depending on the energy present.
7. A cooling curve of the aluminum has been determined, which is controlled by the computer, and is different from the one carried out under normal circumstances;

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