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PROJECT MANAGEMENT FOR THE VISUALISATION DATA BASE OF THE LUBRICATING GREASES

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Summary: The paper presents the project management for the visualisation data base of the lubricating greases, concerning the stages of the project, the time and financial resources of this research.
Using the visualisation data base of the lubricating greases it is possible to chose one and to determine its principal characteristics and, also it is possible to visualise its mycroscopic structure, these technical informations being organized into the data base. These instruments were created for the achievement of a structural analysis for the greasses reability determination, which is useful in all industrial sectors.

1. INTRODUCTION

The paper presents the project management involving development teams to take ownership of the project schedule and improve their estimation reliability based on earned value analysis. This approach will also allow development teams to translate actuals versus estimates into process improvements, adding increased reliability to follow-on task estimation efforts.

One of the purposes of the research project is to create a visualisation data base of the lubricating greases, which allows the choice of the non-Newtonian fluid specific datas and the visualisation of its mycroscopic structure.

Project management involve each partener of the team with his own activity, according to the others' activities, durind an establised long standing. Along the project phases each partener has one or more activities, which interferes with the others, leading to the final purpose.

The agreement of all project members established a number of six phases, with fixed therms and financiar resourses, the results obtained for each phase being specific to the activity purpose:

- Fundamental study and documentation for lubricating greases flow processus simulation virtual laboratory;
- Drawing up and achievement of the demonstration software and data base for the lubricating greases rheological tests;
- Drawing up and achievement of the virtual instrumentation for the mouvement simulation;
- Drawing up and achievement of the images data base for the visualisation of the lubricating greases microscopic structure;
- Virtual instrumentation experimentation and optimisation;
- National and international comunications for the obtained results.

Most automotive and industrial lubricants contain additives designed to enhance total product performance. These added materials are present in many forms, from the all-pervading soap network of a grease, through the high-molecular-weight polymers used to improve the viscosity index, to the nanometre sized detergent micelles present in an engine oil.

During use, additional material, in the form of soot, additive degradation products and wear debris, may also become incorporated. Although optical micoscopy may be sufficient to observe some of the larger agglomerations of particulate material arising from extensive lubricant use, the greater resolving power of the electron microscopy is required to image the majority of particles, especially during the early stages of degradation.

There are specific techniques and processes such as the extraction of insolubles, in a form suitable for introduction into the vacuum environment of an electron microscope; it is not very difficult, but it has been necessary therefore to develop a variety of complementary techniques to effect complete characterization of insolubles in lubricants. That's why there is a number of techniques which have proven to be of value in the preparation of specimens containing mineral oil and greasses, for examination in scanning (SEM) and transmission (TEM) electron microscopes. Using TEM the enlargement is variable between 8000 X-200.000 X, function the product nature and the investigation purpose.

2. ELECTRONIC MICROSCOPY EXAMINATION TECHNIQUES

Lubricating grease is defined by the American Society for Testing and Materials (ASTM) as a solid or semi-fluid lubricant consisting of a thickening agent in a liquid lubricant. It is important to improve certain properties and functions, and also, the additional components sometimes included (the additives), [1].

Lubricating greasses consists in a soap as a solid or semifluid lubricant agent, into a liquid lubricant. The microstructure of the soap phase has the shape of fibres, which imobilise great quantity of liquid into their framework.

The mineral oil into the soap fibres network is like a jelly which become deformed applying cutting forces and come back to the solid statement after the forces dissapear.

Soap fibres are 80 nm thickness and consists in Ca and Li salt of hydrostearic acid, the greasses quality and performances are influenced by their dimensional and spatial distribution. But the solid insoluble elements majority is too small to visualize using optical mycroscop, being necessary the electronic microscope and its high resolution - for the morphological examination of the additives and thickening elements needed in the quality greasses performance.

Lubricating grease properties depend on both its composition and the manufacturing process used. Using SEM (Scanning Electron Microscopy) – or TEM (Transmission Electron Microscopy) - it is possible to obtain structural network images of the metallic soap into the grease. There are presented some examples of usual greases which were prepared in order to realize the images of the data acquisition using SEM (figures 1, 2):

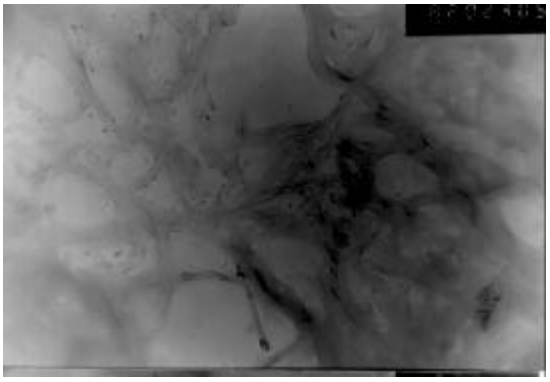


Figure 1. L95 Ca3/4 G grease

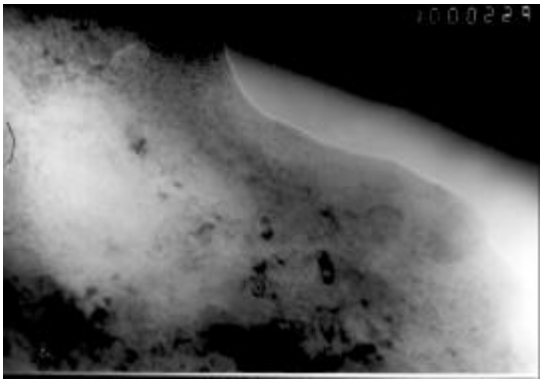


Figure 2. UM 185 Li0 grease

The greases quality and performances are essencially influenced by the dimensional and spatial soap fibers distribution. Using electronical microscopy it is necessary to examine the additives and the soaps, which concure to the high performance quality greases, [2].

The stage of the images data base achievement gives good informations to the researches concerning greasses thermical degradation. Studying several greasses types there were obtained experimental results, using TEM. It is possible to visualize, by this method, the soap fibres network and other insoluble solid elements, but the tests must be suitable prepared. Best results were obtained using extraction gas, heptan or hexan – as solvents. The aspect of the fibre structure is identical with the one from speciality literature [1] (figures 3 - 8).

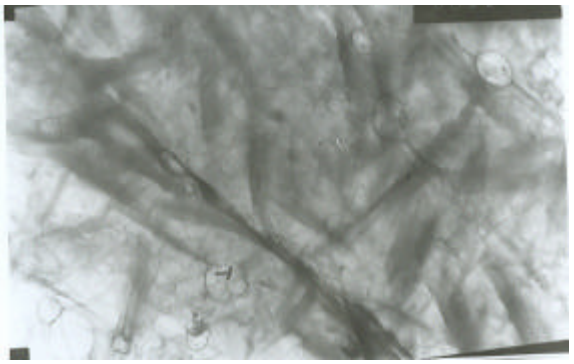


Figure 3. U85 Ca 3

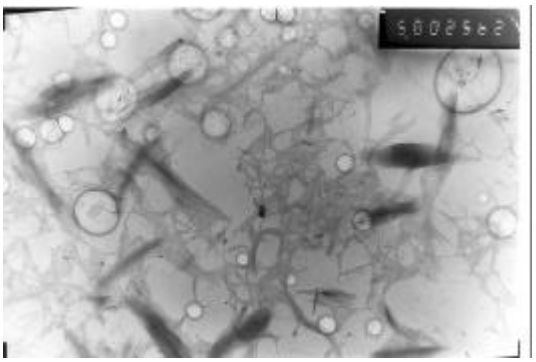


Figure 4. U 90 Ca 1

Advanced and coherents mineral fibres networks, with high conectivity degree is cleary seen in Figures 5 and 8, which make a similarity to a good rheological behaviour of those greasses.

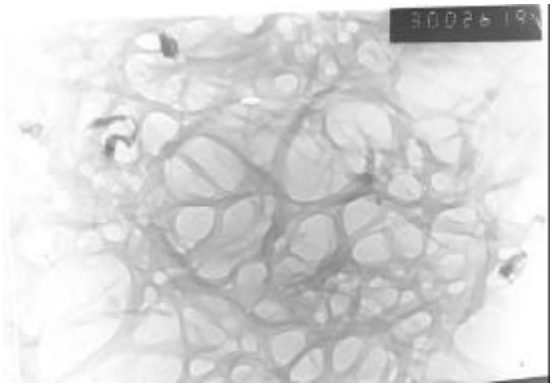


Figure 5. U 185 L iEP

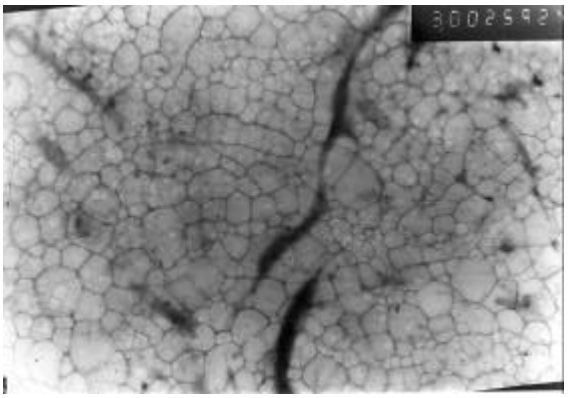


Figure 6. RUL 145

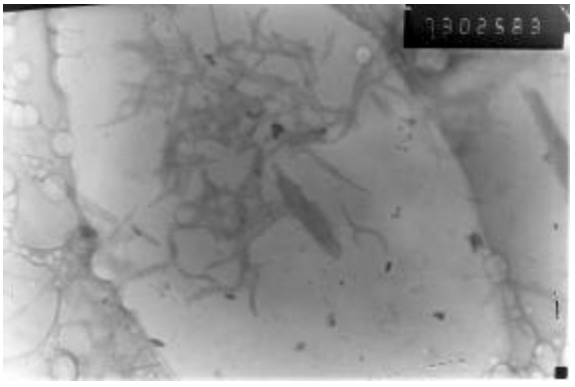


Figure 7. RUL 165 Na 3

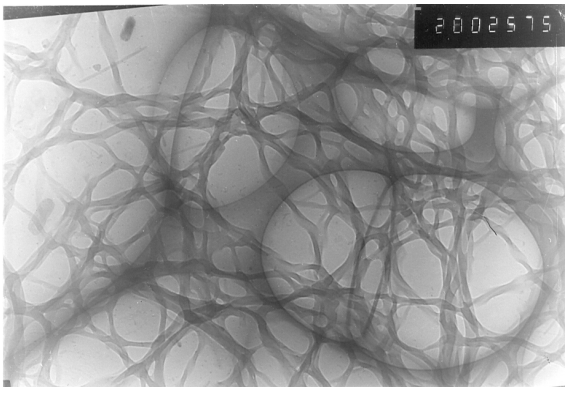
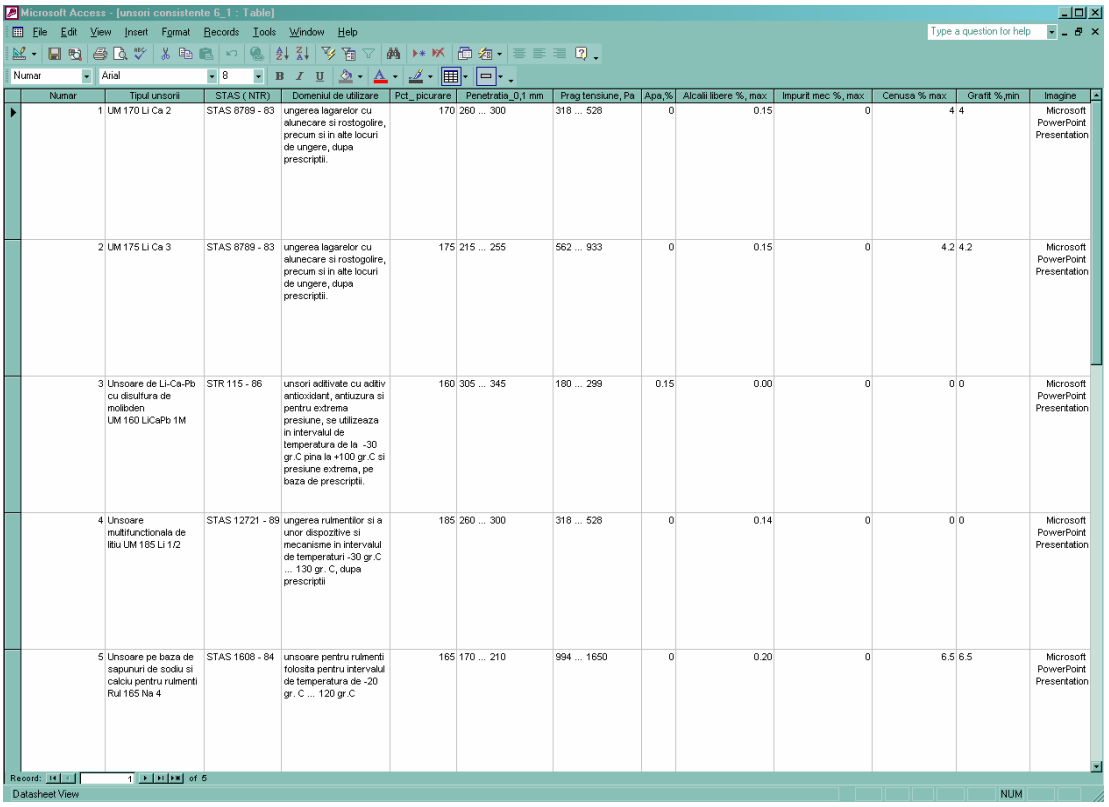


Figure 8. Shell R2

3. IMAGES DATA BASE FOR THE VISUALISATION OF LUBRICATING GREASES. PROJECT MANAGEMENT FOR THE VISUALISATION DATA BASE.

Images data base contains informations for each grease recorded and it consists in colour, drip point, 25^0C penetration, water percentage, free alkali percentage, mechanical impurities, ash percentage, thermical stability, neutralisation index, corrosive action on a steel slate, representative image (figure 5).



Numar	Tipul unsorii	STAS (NTR)	Domeniul de utilizare	Pct_ picurare	Penetratia_0,1 mm	Prag tensiune, Pa	Apa,%	Alcalii libere %, max	Impurit mec %, max	Cenusa % max	Grafit %,min	Imagine
1	UM 170 Li Ca 2	STAS 8789 - 83	ungerea lagarelor cu alunecare si rostogolire, precum si in alte locuri de ungere, dupa prescriptii.	170	260 ... 300	318 ... 528	0	0.15	0	4	4	Microsoft PowerPoint Presentation
2	UM 175 Li Ca 3	STAS 8789 - 83	ungerea lagarelor cu alunecare si rostogolire, precum si in alte locuri de ungere, dupa prescriptii.	175	215 ... 255	562 ... 933	0	0.15	0	4.2	4.2	Microsoft PowerPoint Presentation
3	Unsoare de Li-Ca-Pb cu disulfura de molibden UM 160 LiCaPb 1M	STR 115 - 86	unsori aditivate cu aditiv antioxidant, antiuzura si pentru extrema presiune, se utilizeaza in intervalul de temperatura de la -30 gr.C pina la +100 gr.C si presiune extrema, pe baza de prescriptii.	160	305 ... 345	180 ... 299	0.15	0.00	0	0	0	Microsoft PowerPoint Presentation
4	Unsoare multifunctionala de litiu UM 185 Li 1/2	STAS 12721 - 89	ungerea rulmentilor si a unor dispozitive si mecanisme in intervalul de temperaturi -30 gr.C ... 130 gr. C, dupa prescriptii	185	260 ... 300	318 ... 528	0	0.14	0	0	0	Microsoft PowerPoint Presentation
5	Unsoare pe baza de sapunuri de sodiu si calciu pentru rulmenti Rul 165 Na 4	STAS 1608 - 84	unsoare pentru rulmenti folosita pentru intervalul de temperatura de -20 gr. C ... 120 gr.C	165	170 ... 210	994 ... 1650	0	0.20	0	6.5	6.5	Microsoft PowerPoint Presentation

Fig. 5. Images data base – lubricating greases recordings

Each registration from images data base contains different images representing microscopic structure phases of the analised grease, giving informations about performance quality grease (Figure 6).

Project management for the visualisation data includes all the necessary activities involved in the project development, according to the general plan of the project.

The essential concept is Critical Path Analysis, which means that some plan activities are dependent on other activities being completed first. These dependent activities need to be completed in a sequence, with each activity being more-or-less completed before the next activity can begin. These dependent activities are also called 'sequential' activities.

Other activities are not dependent on completion of any other tasks, or may be done at any time before or after a particular stage is reached. These are non-dependent or 'parallel' tasks.

Obtaining microscopic structure images of the analised greases is a basic activity from the schedule activities and it is related to the main images data base with lubricating greases recordings.

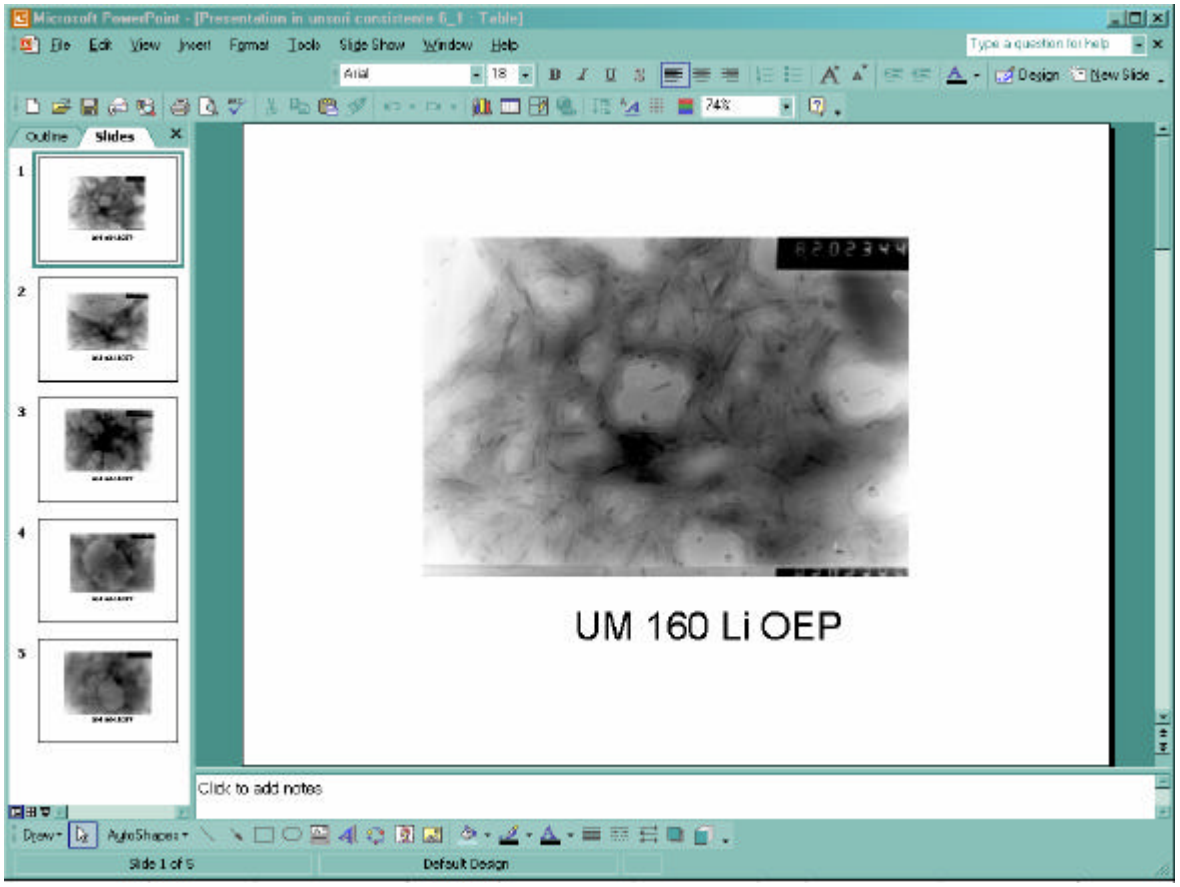


Fig. 6. Images data base – lubricating grease UM 160 .. recording

4. CONCLUSIONS

1. Microscopical structure of lubricating greases data base is a material, informational, methodological and knowledge resourse system, useful in scientifical reaserch developing.
2. It can be developed using the international experience and it follows a better contact between the roumanian research and education and the international values circuit.
3. The results of these investigations will be an aide in the fundamental or application research and also they will assure the documentation at high level instruction and consulting for different beneficiaries.
4. The viability and the success of this data base are guaranteed by the novelty of the idea - to diagnose the behaviour of several tested lubricating greases.
5. The achievement of the project is the informations data base concerning the behaviour of those greases, in various dynamical conditions and the possibility to enrich it every moment.
6. Project management for the visualisation data base gives informations about team reasearch, its efficiency and about the specialisation of its members.
7. The subject of this project give many informations in various fields as: scientifical, engineering, medical, economical, social, being useful for different research organizations or institutions.

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