PATENT ASSIGNMENT

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NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
Maris Kesners	10/24/2007
Eero Martikainen	10/24/2007
Raimo Gronroos	10/24/2007

RECEIVING PARTY DATA

Name:	TriboCer OU
Street Address:	Tartu mnt. 74
City:	Tallinn
State/Country:	ESTONIA
Postal Code:	10140

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	12602297

OP $40.00 12602297

CORRESPONDENCE DATA

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Total Attachments: 16
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PARTNERSHIP AGREEMENT

1 Partners

1.1 Maris Kesners, Riga (social security nr: 020544-13118)
22-8 Zvaigznu,
Riga, LV-1009
Latvia
(later partner)

1.2 Eero Martikainen, Vantaa (social security nr: 240557-125U)
Andersinkatu 2 A 6,
01400 Vantaa, Finland
(later partner)

1.3 Raimo Gröhnroos, Helsinki (social security nr: 021150-171K)
Rasseporinie 3 A 4
00900 Helsinki, Finland
(later partner)

(1.1 - 1.3 later Partners)

2 Background of the Agreement

All Partners are shareholders of TriboCer OÜ (later Company). The intention of the Partners is to agree of, from organization, operation and business point of view, essential mutual commitments that the company needs for long term development and execution of its businesses.

All Partners have carefully and independently evaluated the benefits, commitments, risks and possibilities associated to this contractual arrangement.

3 The resolution of the Agreement

The resolution of this Agreement is to agree about the arrangements and administration of the business and about the rights and duties of the Partners towards each other and towards the Company.

Partner Matis Keaners has a deep and specific practical and scientific knowledge and know-how of the triboceramics technologies. He affirms that he provides all his technical knowledge and research work for the perusal of the Company. As his contribution and as a sign of his commitment to the company he grants all rights of the Patent Application "Triboceramic compound" (the draft attached to this Agreement) to the Company.
Partners Mattikainen and Grönroos have an extensive experience and knowledge of commercial activities regarding triboceramics. They affirm that they coordinate to the managerial and commercial knowledge and skills for the benefit of the Company and cooperation.

The Partners agree to join forces in order to manage and develop the business and technologies of triboceramics as the initial business of the Company so that the Company and profits grow stably and so that the growth rate of the share value hits the best possible.

4 Prohibition of pledge of the shares and corresponding documents and rights

Shares, options, warrants, convertible bonds or other instruments, that can be converted to shares may not be pledged. In general, rights linked to the shares may not be transferred or donated without prior announcement to other Partners.

5 Decision making

In case the consensus in the following matters or issues linked to them cannot be reached within one (1) month time from the moment of the "problem" taken up, the decisions of the following matters may be taken and valid with the majority of 2/3 of the shares:

1 Change of the Company by-laws;
2 Change of number of Board members;
3 Dissolve of the Company;
4 Distribution of dividends;
5 Consistency of the Board

6 Board of Directors

The Board of Directors consists of three (3) ordinary members and of their personal deputies, in case elected. Two (2) members of the Board and their deputies must be of Finnish origin.
Board meetings are held when necessary, however two (2) times during the fiscal year.

The Board to be elected for the first three (3) years is in Annex 2.

7 Managing Director

The Board appoints and discharges the Managing Director.

8 Distribution of dividends

The Company distributes fifty percent (50 %) dividends on the net profit confirmed in the annual fiscal statement. Exemptions request a majority of 2/3.

9 Other agreements connected to the rights of the Partners

The Partners declare that they have not signed and will not during the whole term of this Agreement, sign any other partnership agreements or other agreements, in which agreed of things regulated in this Agreement or things having effect to them.

10 Immaterial rights and know-how

Immaterial rights born within and in connection to the Company operation or later (incl. patents, utility model rights, copyrights and other immaterial rights) and technical knowledge and know-how has born and will be born to the Company. All rights connected and/or related to them will remain Company's rights and must be protected by best possible means.

11 General obligation

Partners commit to by them selves, by their attorney or representative to vote and act in the general meeting, Board and in all other connections and situations in the way the fulfilment of this Agreement requires.

12 Confidentiality

Partners commit to keep this Agreement and all information received on the grounds of this Agreement confidential.

13 Sales of the shares

13.1 The Partners have got the priority redemption right to the shares of the Partners.

13.2 In case a Partner sells or otherwise grants part or all his shares/options/warrants/ convertible bonds, the receiver must in the contract commit to comply with this Agreement.

14 Non-competition

The Partners shall not directly or indirectly by themselves or by companies owned or controlled by the Partners compete with the Company during the whole term of this Agreement.

15 Contribution in form of labour input

The Partners commit to their best ability to promote the operations and activities of the Company and to act for the benefit of the Company. Opposite actions will be considered as breach of the Agreement.

16 Modifications

Modifications to this agreement must be done in writing accepted by 2/3 of the Partners.

17 Term of the Agreement

This Agreement takes effect when signed by each Partner.

This Agreement is valid for each Partner as long as the Partner and any Partner is a shareholder in the Company. This Agreement expires when the Agreement has expired between all Partners. This Agreement expires if/when the Company will be publicly listed.

18 Transfer of the Agreement

This Agreement cannot be transferred without the authorization of all Partners.

19 Notifications

Notifications in accordance to this Agreement may be done by Facsimile, Registered letter or by means otherwise approvable. The notification is considered Fait accompli, when the

Facsimile has been sent or three (3) days from the mailing of the Registered letter or when the notification has been carried out otherwise approvable.

20 Breach of the Agreement and sanctions

A Partner that violates this Agreement must pay a sanction of two thousand (2000) Euro to each violated Partner. The sanction must be paid equally to each Partner violated or in case Partners mutually request to the Company. Payment of the sanction does not remove the Partner's liability for damages from the part that the damage exceeds the amount paid sanctions.

21 Conflicts

Conflicts arising from this Agreement will be settled in the city court of Helsinki unless not resolved by mutual reconciliation.

22 Applicable law

The applicable law of this Agreement is the Finnish law.

23 Number of Agreements

This Agreement has been stipulated in three (3) equal copies, one for each party.

Tallinn, October 24, 2007

Signatures

Maris Kesters Eero Mattikainen Raimo Grönroos

ATTACHMENTS

1. Company by laws (Annex 1.)
2. Board of Directors (Annex 2.)
3. Draft of the Patent application "Triboceramics"

TRIBOCERAMIC COMPOUND.

The invention relates to the machine building and can be applied for the treatment of friction surfaces by triboceramics to improve the quality of surfaces and increase the working life of mechanisms.

Patent RU2246531 describes a triboceramic compound introduced into the lubricant and/or diesel fuel during the operation time of engine. Triboceramic layer is coated on the friction pairs of parts on/over their areas of surface contacts. The compound consists of serpentine - 3÷5%, magnetite - 2÷3%, dolomite - 0.5÷1%, amphibole - 1.5÷2% and amachinite - 1÷2%.
However, the true composition of a compound depends on the location and a lot of raw materials, which may comprise a variety of admixtures. This does not allow to ensure stable triboceramic parameters. The compound is suitable to form triboceramic layer merely on hard ferric alloys.

Triboceramics to be covered on a part electrolytically in a thin layer is described in the patent RU95111910. The compound consists of alfa-Al_2O_3, being introduced in the gamma-Al_2O_3 stencil. The alfa-Al_2O_3 crystals have a fibrous structure. Electrolysis takes place in alkaline aqueous solution. One electrode is made of copper but the other one - of electrolytically insoluble material. The technology is very energy consuming and is not friendly to the surrounding environment.

A compound, which provides formation of a new-made layer on the friction surfaces is described in patent RU2266979. The compound forms triboceramic layer on the friction surfaces of parts possessing self-restoration effect in the course of operation of a mechanism. The compound is made on the basis of natural nicel-iron-magnesian hydrosilicates - 90÷95% - used as catalyst is

forsterite or fayalite - 5÷10%. The size of grains is 1-100μm. The compound can be applied for ferric alloys only to cover the surfaces of ready-made parts.
Natural minerals, if not deliberately cleaned, usually contain a great and variable amount of admixtures of crystalline quartz. Consequently, this compound has very unstable quality parameters in reality, and it can be applied for coating by triboceramics merely very hard surfaces.

The composition for the treatment of friction pairs described in the patent US6423669 is, in its technical substance, mostly related to the invention presented in the embodied application. The mentioned composition is obtained by dehydration of hydrates at moving off the water of constitution with the destruction of the crystal lattice, at the temperature range of 350-900[deg.]C, containing oxides MgO, CaO, Fe_2O_3, K_2O, Na_2O at the stable phase. According to this patent, both natural minerals and synthetic hydrates can be used.
If the hardness index of the raw materials - hydrates is approximately 2÷3 according to the Moss scale, then for dehydrated hydrates it is within the range 5÷7. The compound can be used to build up triboceramic layer on the surfaces of merely ferrous alloys with great degree of hardness. It is not applicable for heat unprocessed surfaces and for the surfaces of non-ferrous metals as it leads to very strong abrasive wear of the surfaces.

The purpose of the presented invention is to enlarge the application range of triboceramic coatings.

The purpose of the presented invention is reached, when the natural and/or synthesized heat unprocessed and/or dehydrated minerals - serpentine, talk, clinochlore, magnesite, quartz and aluminium hydroxide are introduced in a triboceramic compound containing oxides - MgO, SiO_2, Al_2O_3, CaO, Fe_2O_3, comprised in the chemical composition of serpentine and talk, thus forming a compound with the following composition of oxides - SiO_2 - 46÷54%, MgO - 26÷32%, Al_2O_3 - 2÷5%, Fe_2O_3 - 1,0÷1,5%, CaO - 0,1÷0,3%, H_2O ≤5%.

Fig.1 shows the specimen at the initial stage of coating.
Fig.2 shows the specimen at the final stage of coating.
Fig.3 shows the specimen coated by low pressure between parts.
Fig.4 shows the specimen coated by high pressure between parts.
Fig.5. shows the Talyrond trace of the coated specimen.

The natural and/or synthesized heat unprocessed and/or dehydrated minerals - serpentine, talk, clinochlore, magnesite, quartz and aluminium hydroxide are introduced in a triboceramic compound containing oxides - MgO, SiO_2, Al_2O_3, CaO, Fe_2O_3, comprised in the chemical composition of serpentine and talk, thus forming a compound with the following composition of oxides - SiO_2 - 46÷54%, MgO - 26÷32%, Al_2O_3 - 2÷5%, Fe_2O_3 - 1,0÷1,5%, CaO - 0,1÷0,3%, H_2O ≤5%.

With the triboceramic compound, containing oxides - MgO, SiO_2, Al_2O_3, CaO, Fe_2O_3, comprised in the chemical composition of serpentine and talk, the natural and/or synthesized heat unprocessed and/or dehydrated minerals serpentine, talk, clinochlore, magnesite, quartz and aluminium hydroxide, forming a compound with the following composition of oxides - SiO_2 - 46÷54%, MgO - 26÷32%, Al_2O_3 - 2÷5%, Fe_2O_3 - 1,0÷1,5%, CaO - 0,1÷0,3%, H_2O ≤5%, the parts are coated by pressing them reciprocally, causing sliding and/or rolling friction between the surfaces.
The particles of the compound while pressed between the surfaces, are plastically deformed and/or destroyed. Mechanoactivation of the compound takes place too. During this process heat build-up takes place. If the hydrate is heat unprocessed and contains the bound water, it has a lower degree of hardness and it is much more pliable if compared with the dehydrated one. In the course of thermal process water is exuded causing fall in the temperature of a particle, nevertheless the sintering temperature is reached.
The particles become pliable and the bonds in the crystal lattice are disengaged in the area of the exuded bound water. Reciprocal sintering of particles provides formation of ceramic layer. It is relatively soft and easy to deform. While increasing the pressure between the particles, the respective layer gets consolidated and provides formation of compact olivine layer. Fayalite is being formed at the contact area with the surface containing iron and the reason of this is the interchange of Fe⇔Mg between triboceramics and base layer. Further on a layer of forsterite is built up. In theory, the latter can be formed without any limits. In practice, the amount of the introduced compound and the size of parts limit it.
Fig. 1 shows how fayalite-phorsterite layer has covered the profile peaks caused by grinding and the process of the infill of cavities has set in (in the central part of the picture).

Fig.2 depicts the specimen at the final stage of coating. The profile of the traces of grinding is not evident. Triboceramic layer has covered the whole surface of the part and is forming a continuous friction surface.
Fig. 3. Shows the picture of the surface, built up of a heat unprocessed compound under low pressure. It provides formation of triboceramic layer consisting mainly of the hydrates, forming the compound. It is porous in structure and is capable of retaining lubricants in its pores. Upon pressing, the layer undergoes elastic deformations and lubricants are exuded on the surface. If pressure is removed the lubricant is soaked up back into triboceramic layer. An uninterrupted process of oiling of the sliding surfaces of parts takes place. The hardness of triboceramic layer is in the rage of 2÷3 according to the Moss scale.
Fig.4. Depicts the picture of the surface, on which triboceramic layer was formed out of the dehydrated compound under the action of high pressure. The surface is dense and without pores. The hardness of the surface is in the range of 6-7 according to the Moss scale.
Fig.5. Depicts the Talyrond trace of the surface shown in Fig.4. It is evident from the picture that the profile of the surface has no sharp edges. If such surfaces are mutually sliding, there will be no elements on a profile, which might be mutually gripped and "spot-welded" as a result of friction and thus, by ripping the bonds of welding, cause wear of the surfaces of parts.
Even if the friction surfaces start reciprocally moving and all the lubricant between the surfaces is squeezed out, the smooth and hard protuberances of the surface are sliding past each other without getting gripped. Once the movement has normally started off, it provides the formation of a normal layer of the lubricant and the surfaces get into contact merely through the layer of the lubricant.
By changing the components introduced in the compound it is possible to change the amount of the bound water. Thus the temperature of the process can be adapted. If all the component parts are the heat unprocessed hydrates, the process will take place at lower temperatures and will provide the formation of more pliable and porous triboceramic layer. In order to decrease the temperatures even more, $Al(OH)_3$ is introduced in the compound. Consequently, it exudes water in great amount thus considerably lowering the temperature of the formation of triboceramic layer. Al_2O_3, which remains after the exudation of water, increases the hardness of triboceramic layer. If soft materials such as untempered Fe alloys and alloys of non-ferrous metals, are coated with triboceramics, the particles of the dehydrated

compound will merely cause abrasive wear of a part when pressed on the surface of a part. Consequently, it will not provide formation of triboceramic layer. In order to provide it, the heat should be emitted as a result of deformation, in such a micro amount as to exude the bound water out of the compound, thus disengaging the bonds.

The temperature at the contact area of the contact surface of a part and the particles of a compound should be such as to cause the joining of the crystal lattices both of a part and the particles of a compound. The interchange of Fe⇔Mg, or any other elements take place, depending on metal alloys.
This is a harmonized process, where the properties of both the elements - the compound and the part should be taken into account. A large dispersion in the composition of a compound is to be excluded in order to obtain the required precision in the process, which mostly depends on the composition and pressure. As the composition of natural raw materials differs even within the boundaries of one and the same mine, each lot of raw materials should be tested separately and the proportions of ingredients are to be calculated according to the results of the tests. The synthetic materials do not encounter this problem, therefore it is advised to use synthetic components in triboceramic compounds.

The presented compound can be used to form a wear-resistant triboceramic layer with an extremely low friction coefficient on the friction surfaces of the parts of different metal alloys.