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(54) **A preshaped abrasive element**

Vorgeformtes Schleifelement

Élément abrasif préformé

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Description

[0001] The present invention relates to a preshaped abrasive element for mass finishing of surfaces, tumbling, vibro-finishing, and similar applications.

[0002] The range of preshaped abrasives available worldwide for mass finishing surfaces, tumbling, and vibro finishing, also referred to as finishing "media", has remained substantially unchanged for about half a century. The families of preshaped abrasives or finishing media are divided into the following general categories:

- plastics, generally formed by casting, using thermosetting resins suitably mixed with abrasives, and representing proportionally the largest section of the market;
- ceramics, generally formed by extrusion, very widely known and widespread around the world.

[0003] Over the years these two categories have been developed and perfected, today representing the main products on the contemporary market in this sector. These general categories can be broken down as follows:

- a) polyester binder plastics: these are the most common preshaped abrasives in the plastics category and characterized by a combination of a binder (polyester thermosetting resin) and an aggregate with an abrasive function (from extremely fine for a polishing action, to highly abrasive for a fast surface stripping action).

[0004] Polyester binder plastics are almost all obtained by casting a polyester thermosetting resin premixed with the powder abrasives in suitable moulds, which can be of varied materials and types. For hot-setting the moulds are inserted into appropriate kilns, while for cold-setting it is sufficient to wait for a reaction time during which the resin catalyzes and solidifies automatically inside the mould. On average a polyester plastic has a density of about 1.7 to 1.8 Kg./dm^3.

[0005] The most common preshaped polyester elements on the market exhibit medium to high abrasiveness and average relative consumption of about 12 to 14% over 24 hours.

[0006] Relative consumption refers to consumption measured using only abrasive media over a fixed time, generally 24 hours, using a known machine, a known starting quantity, constant parameters (vibration, water, temperature, etc.), such as to enable comparison of different types of media, scientifically, over time.

- b) ureic binder plastics: less common preshaped abrasives of the plastics category than the polyester type because certain northern European countries have banned sale thereof because of the presence of formaldehyde which is associated with cancer. Today they are widely used mainly in Spain, Portugal, and Greece. They are characterized by a combination of a binder (ureic thermosetting resin, also known as "ureic glue", widely used in the plywood and chipboard sector) and an aggregate serving as an abrasive (from extremely fine for a polishing action, to highly abrasive for a fast surface stripping action).

[0007] Ureic binder plastics are formed by casting the resin in approximately the same way as for polyester binder plastics. On average a ureic plastic exhibits a density of about 1.4 to 1.5 Kg./dm^3. The most common preshaped ureic plastic elements on the market exhibit a medium to high abrasiveness and average relative consumption of about 20 to 25% over 24 hours.

[0008] Ureic plastics known as "aminoplastics" are available on the market and can last longer compared to normal ureic plastics, offering the possibility of reducing wear and consequently the release of formaldehyde in industrial effluent. Average relative consumption measured on medium to high abrasives was about 13 to 16% over 24 hours.

- c) ceramic abrasives: the most common preshaped abrasives in the ceramics family and characterized by the combination of a binder (chalk, clay) and an aggregate of abrasive function, very often corundum (from very fine, for a polishing action, to highly abrasive and/or coarse for a quick stripping action).

[0009] Ceramic abrasives are mostly obtained by extruding a humid ceramic mixture of clay and abrasive, which is then cut, dried, and subsequently fired. Uncommon forms exist, including pyramids and cones, formed by moulding the humid ceramic mixture. On average a ceramic abrasive has a density of about 2.1 to 2.3 Kg./dm^3.

[0010] The most common preshaped ceramic abrasives on the market exhibit medium to high abrasiveness and average relative consumption of about 5 to 10% over 24 hours. The qualitative assessment parameters for ceramic abrasive elements generally also include a chipping fraction. This parameter is a percentage of small fragments detached from the projecting corners of the preshaped elements measured (percentage weight) after new ceramic elements are used for the first time. New preshaped ceramic abrasive elements exhibit a tendency to produce small chips as a consequence of relatively high firing temperatures during production generating microcrystaline structures typical of hard, dry materials.

- d) porcelain ceramics: this group is a member of the ceramic abrasives category and is substantially a mixture based on about 60% alumina. Abrasives are not generally added to the ceramic mixture because the material itself, once "run-in", is capable of generating a surface polishing action.

[0011] The production techniques are similar to those described for ceramic abrasives. On average porcelain ceramic abrasives exhibit a density of about 2.6 to 2.8 Kg./dm^3. Versions referred to as "high density porcelain" also exist, of densities up to about 3.1 to 3.3 Kg./dm^3, for special processes or for processing particularly heavy products.

[0012] The most common preshaped porcelain ceramic abrasives on the market are substantially polishing in effect and exhibit very low average relative consumption, sometimes irrelevant at about 0.5 to 1.5% over 24 hours.

[0013] The assessment parameters for the quality of porcelain ceramic abrasives, like normal ceramic abrasives, also include chipping. Before porcelain abrasives can provide good quality polishing, pre-treatment is often required, referred to as "conditioning" or "running-in".

[0014] In relation to the overview provided above, finishing media exhibit a series of technical problems as detailed below.

[0015] Polyester plastic binders can create problems both in olfactory terms and in the production of foam inside the machine. Even when these problems are not significant, there is always a problem of a waterproofing effect on the filterpress screens used in a section of the market for the treatment of effluent water. Compared to the effluent produced using ceramic or ureic media, polyester plastic binder media waterproof and/or obstruct filterpress screens much more rapidly, increasing the required level of routine maintenance interventions. In the majority of plastic abrasive elements available on the market dimensional and sometimes geometric variations are possible, dependent on the type of mould used, the type of casting, and the machines used.

[0016] Ureic binder plastics present problems both in olfactory terms (resulting from the release of formaldehyde into the air during storage, especially during the hot season) and in terms of weight loss over time, resulting from the continuous transudation of the water content of the base resin, especially in hot climates. Even when these problems are not significant, it is possible that transport during very cold periods, or storage in the open during very cold winters, can result in cracking of the abrasive elements, resulting from the increased volume of the water molecules contained in the preshaped elements. The most significant problem of preshaped ureic abrasive elements is very high consumption and an excess of free formaldehyde in the effluent. Like polyester plastic elements, ureic elements sometimes exhibit dimensional and geometric variability.

[0017] Ceramic abrasives are affected by chipping which results in objective problems during operations of automatic loading and unloading using tipping elevators, buckets, and all the automations involved in cascade loading systems. The dropping of heavy items into a tumbling machine tank can cause fragmentation and chipping. There is a risk of chips and small fragments jamming inside blind holes in items, blocking vibration tumbling effluent release filters, penetrating into the interspaces between the rotating disk and cylinder of disc type centrifugal machines, and many other problems and unforeseen outcomes.

[0018] As a consequence of the density/abrasive type (corundum) ratio, ceramic media tend to darken and to "work-harden" certain surfaces. The result of deburring or polishing with ceramic elements can be unsuccessful polishing, or successful polishing with darkening. In other cases, particular problems of inclusion of abrasive material (particles of corundum) occurr in the surface porosity/texture of metal products processed using preshaped ceramic abrasives.

[0019] All ceramics are subject to shrinking as a consequence of the processes of drying and firing subsequent to extrusion or casting.

[0020] Porcelain ceramics exhibit problems of chipping similar or even worse than ceramic abrasives.

[0021] Porcelain firing temperatures can reach values as high as 1300°C resulting in extremely rigid crystal structures characterized by easy angular fragmentation.

[0022] A further typical problem of porcelain elements is the need for running in or conditioning before a high standard polish can be attained, due to the firing process giving the porcelain a relatively rough finished surface porosity.

[0023] All porcelain ceramics are subject to shrinkage due to the processes of drying and subsequent firing following extrusion or casting.

[0024] All the media described above share a common characteristic that once scrapped, because of inadequate size, they are generally disposed of as waste material.

[0025] Document US 3,684,466 discloses an organic polymer bonded tumbling chip, consisting essentially of 20 to 80% by weight of a thermoset organic polymer selected from the group consisting of unsaturated polyester, epoxy, and phenol-aldhehyde; 5 to 30% by weight of a powder thermoplastic selected from the group consisting of polyethylene, polypropylene, polytetrafluoroethylene, and polyamide, said thermoplastic polymer being of such degree of fineness to pass through a 10 mesh screen, and 0 to 75% by weight of abrasive.

[0026] The same invention aims to combine unprecedented formulation flexibility with a production precision which is free of the defects of the media of known type and summarized above, and therefore a precision in tune with the increasingly refined qualitative demands of the future. The invention is also in tune with manufacturing techniques of low environmental impact and significant reduction of emissions, combined with wide-ranging possibilities for the recycling of the materials.

[0027] These aims are attained by the present invention, which provides a preshaped abrasive element for mass finishing of surfaces, tumbling, vibro finishing, and similar applications, comprising at least an abrasive or a mixture of abrasives dispersed in both a thermoplastic binder and a thermosetting binder, as per claim 1.

[0028] In particular, a preshaped abrasive element of

the invention, serving as a substitute for a polyester binder plastic or a ureic binder plastic, possibly comprising an abrasive or a mixture of abrasives, for example quartz of variably fine qualities, in a proportion of 40% of weight, dispersed in both a thermoplastic binder, for example polyethylene, in a proportion of 40% of weight, and a thermosetting binder, for example polyester, in a proportion of 5% of weight, and comprising a further component, for example barite, serving to confer the preshaped element a required density, in a proportion of 15% of weight.

[0029] A second type of preshaped element of the invention, serving as a substitute for a ceramic abrasive element of known type, comprises an abrasive or a mixture of abrasives, for example red-brown corundum and white corundum, in a proportion of 5 to 25% of weight, dispersed in a thermoplastic binder, for example polyethylene in a proportion of 45% of weight, a thermosetting binder, for example polyester, in a proportion of 10% of weight, and comprising a further component, for example barite, serving to confer the preshaped element a required density, in a proportion of 20% of weight.

[0030] A third type of preshaped element of the invention, serving as a substitute for a porcelain element, comprises an abrasive or a mixture of abrasives, for example alumina, in a proportion of 55% of weight, dispersed in both a thermoplastic binder, for example polyethylene in a proportion of 35% of weight, and a thermosetting binder, for example polyester, in a proportion of 5% of weight, and comprising a further component, for example zircon, serving to afford the preshaped element a required density, in a proportion of 5% of weight.

[0031] In the present description the term "substitute" refers to an abrasive element of the invention, exhibiting a special composition and properties such that it can replace a corresponding abrasive element of known type, providing significant and surprising advantages as described below in the text of the present description.

[0032] The principal manufacturing technique for the abrasive elements of the invention is casting, providing preshaped abrasive elements exhibiting excellent geometric and dimensional constancy, with minimal shrinkage and not comparable with abrasive elements of known type.

[0033] The alternative manufacturing technique for the abrasive elements of the invention is extrusion, but limited to a few types and carefully designed to ensure maximum precision.

[0034] The advantages provided by the preshaped elements of the invention, or abrasive media, are described below, dealing case by case with the problems discussed above regarding abrasive media of known types. Compared to polyester binder plastic media, the media of the invention can achieve the same results in qualitative terms when formulated at similar density and abrasiveness to polyester binder plastic elements of known type. When the new media of the invention are formulated for increased abrasiveness and higher density the same results can be achieved in reduced times.

[0035] Simultaneously, and additionally, the new media provide:

- an almost total reduction in olfactory problems due to the absence of significant quantities of volatile substances (like for example styrene in polyester) in the formulation;
- an almost total reduction in the problem of foaming;
- a considerable reduction in the phenomenon of waterproofing of the screens of filterpress systems for the sludge contained in process effluent;
- a reduction in geometric defects and dimensional imprecision;
- reduced consumption in a proportion in the range from 1/8 to 1/14, in some cases superior, with resulting reduced costs of transport, storage, volumes and costs of disposal and transport of sludge by-products.

[0036] The manufacture of the preshaped abrasive elements of the invention foresees drastically reduced environmental impact as regards atmospheric emissions and reduced energy consumption for each kilogram produced. Residual waste materials (sizes no longer suitable for the process) can be recycled as second use raw materials, in limited percentages, for the manufacture of the elements of the invention.

[0037] Compared to ureic binder plastic media, the media of the invention can achieve the same results in qualitative terms when formulated at similar density and abrasiveness to ureic binder plastic elements. When the new media of the invention are formulated for increased abrasiveness and higher density the same results can be achieved in shorter times.

[0038] Simultaneously, and additionally, the new media provide:

- an almost total reduction in olfactory problems due to the absence of significant quantities of volatile substances (like for example formaldehyde in ureic resin) in the formulation;
- an almost total reduction in the problem of weight loss (resulting from the water content of the ureic resin, which is absent in the new formulations);
- an almost complete reduction in geometric defects and dimensional imprecision;
- reduced consumption in a proportion in the range from 1/10 to 1/16 and in some cases greater, with resulting reduced costs of transport, storage, volumes and costs of disposal and transport of sludge by-products.

[0039] The manufacturing process foresees a drastically reduced environmental impact as regards atmospheric emissions and reduced energy consumption for each kilogram produced.

[0040] Residual waste materials (sizes no longer suitable for the process) can be recycled as second-use raw

materials, in limited percentages, for the manufacture of the new media elements.

[0041] Compared to ceramic abrasive media, the media of the invention can achieve the same results in qualitative terms when formulated at similar density and abrasiveness to ceramic abrasive elements.

[0042] Simultaneously, and additionally, the new media provide:

- an almost total reduction of the problem of fragmentation due to the use of two binders (thermoplastic and thermosetting binders) in the place of a ceramic clay which is dried and then kiln-fired. The new abrasive element of the invention exhibits more elastic surfaces, less rigid and consequently less prone to fragmentation;
- an almost complete reduction in geometric defects and dimensional imprecisions, which are also a result of shrinkage phenomena;
- reduced consumption in a proportion in the range from 1/2 and 1/5, and in some cases superior, with resulting reduced costs of transport, storage, volumes and costs of disposal and transport of sludge by-products.

[0043] The manufacturing process foresees a drastically reduced environmental impact as regards atmospheric emissions and reduced energy consumption for each kilogram produced.

[0044] Residual waste materials (sizes no longer suitable for the process) can be recycled as second use raw materials, in limited percentages, for the manufacture of new media elements.

[0045] Compared to porcelain ceramic abrasive media, the media of the invention can achieve the same advantages as porcelain ceramic abrasive elements, with the exclusion of the rate of consumption. The new media does not exhibit lower consumption rates than a porcelain ceramic media.

[0046] The surface of the preshaped element of the invention is already smooth and does not require runnin-in before use for polishing.

[0047] As already stated, the typical formulation of the media of the invention comprises at least the following characteristic components:

- a thermoplastic binder;
- a thermosetting binder.

[0048] The first two components together comprise an innovative form of binder. Though known separately, the combination of the two binders has proved innovative, in particular after conceiving the idea of generating a series of extremely multi-purpose media. Technical process testing based on formulations comprising variable proportions of the two binders have led to important improvements in the results. - An abrasive or mixture of abrasives.

[0049] The series of media of the invention can be manufactured using a very heterogeneous variety of abrasives including quartz (typically combined with the plastic and ureic media of known type), corundum (typically combined with ceramic media of known type), aluminium oxides, neosilicates, tectosilicates, providing variants of hardness, granulometry, and crystalline structure capable of exercising the most varied actions from general stripping to micro polishing. The abrasives characterizing each individual formulation of the new media can be of a single type or blends of multiple types such as to provide a balancing of finishing action on the basis of design requirements.

- A density modulator, or an element serving to confer a required density to the finished product.

[0050] An important intrinsic characteristic of the media of the invention is the possibility of simulating an action of a preshaped abrasive media of known type. To achieve this it is essential to formulate a density more typical of ceramics than of plastic, as described below.

[0051] For this reason, while, in certain respects, an ideal formulation might be based on binders and abrasives resulting in a density of 1.85 Kg/dm^3, the formulation of the invention can also emulate a density required by a process, which for example could be 2.9 Kg/dm^3. A media of density 2.9 Kg/dm^3 behaves very differently from media of density 1.85 Kg/dm^3, but not only. A tumbling machine, for example of vibrating, circular tank type, can behave differently both as regards vibratory motion (spiral dynamics arising from a combination of rotary motion and translation), and as regards amplitude (millimetres of displacement between the upper and lower limits of a sussultatory motion of a vibrating tank). The loading capacity of tanks is generally expressed in litres. If a 1000 litre volume tank is loaded with abrasives of 1.85 Kg/dm^3 the load is 1850 Kg. If the same volume is loaded with abrasives of 2.85 Kg/dm^3 the load is 2850 Kg., the difference in load being 1000 Kg. and proportionally 54% greater. Consequently, a machine requires at least adjustment of its vibrational motion (angular and/or eccentric adjustment, centrifugal force) in order to determine the necessary forces intended, for example, for correct automatic extraction or, simply, to achieve the ideal values of amplitude and operational dynamics.

[0052] Finally, weight plays an important role in accelerating an abrasive action. For example, a hand lightly running sandpaper over a surface does not achieve the same effect as a hand pressing down hard. Weight is also important in cases in which very heavy metal items are inserted into the abrasive mass loaded in a machine for fine finishing treatment. Clearly when using a relatively low mass media a lack of the necessary "insulation" and "shock - absorbence" can develop between the items, which can approach each other, inadequately cushioned, at excessive speed, resulting in impact shocks and surface damage. Having established the importance of an appropriate media density, it is clear that

the new media provide an important development in this respect as a result of the balancing of the formula with a component that enables adjustment of density as required, representing a sort of "density modulator".

[0053] In the investigations conducted to date with the aim of identifying a suitable component for adjusting density, various families of materials have been studied including:

- Barite - 4.5 g/dm^3
- Silicon carbide - 3.2 Kg/dm^3
- Feldspar - 2.6 kg/dm^3
- Hollow glass spheres - <1 Kg/dm^3
- Zircon - 4.7 Kg/dm^3.

[0054] In conclusion, the experience resulting in submission of the present patent application has unequivocally demonstrated the possibility of substituting, with the innovative media described, not only almost all types of preshaped abrasive plastic and ceramic elements of known type but also to:

produce the new preshaped elements creating less pollution and consuming less energy per kilogram manufactured;
manufacture with improved safety margins in terms of reduced fire risk from styrene, flammable resins, and similar substances;
produce with a minimal content of substances of negative impact on health, like volatile organic substances, formaldehyde, and similar substances; provide more durable products, resulting in reduced transport costs, reduced use of storage areas, producing less effluent sludge with related costs of disposal and transport;
enable recycling of the majority of the new media, following disposal due to wear;
reduce chronic problems like rapid wear of plastics, odours, foaming, chipping, and geometric/dimensional imprecisions;
the reduced wear of the preshaped elements and the reduced production of foam reduces the need for rinsing and consequently reduces water consumption.

[0055] Clearly many of the parameters provided are indicative and cited with the sole purpose of indicating the differences and concepts being explained in each specific case.

[0056] Obviously, modifications or improvements could be made to the invention, in response to special or contingent requirements, without going outside of the range of the invention as claimed below.

Claims

1. A preshaped abrasive element for mass finishing surfaces, tumbling, vibro finishing, and like applications, comprising at least an abrasive component or a mixture of abrasive components, dispersed in both a thermoplastic binder and a thermosetting binder, wherein the preshaped abrasive element comprises the abrasive component or a mixture of abrasive components in a proportion of 25% to 55% of weight, dispersed in both the thermoplastic binder in a proportion of 35% to 55% of weight and in the thermosetting binder in a proportion of 5% to 10% of weight, wherein the preshaped abrasive element also comprises a further component, selected from the group consisting of barite, silicon carbide, feldspar, hollow glass spheres and zircon, the further component serving to give the preshaped element a required density, in a proportion of 5% to 20% of weight.

2. The preshaped abrasive element of claim 1, serving as a substitute for a polyester plastic binder or a ureic plastic binder, **characterized in that** it comprises an abrasive component or mixture of abrasive components in a proportion of 40% of weight, dispersed in both a thermoplastic binder in a proportion of 40% in weight and a thermosetting binder in a proportion of 5% of weight, and comprising a further component serving to afford the preshaped element a required density in a proportion of 15% of weight.

3. The preshaped abrasive element of claim 1, serving as a substitute for a ceramic abrasive element of known type, **characterized in that** it comprises an abrasive component or a mixture of abrasive components in a proportion of 25% of weight, dispersed in both a thermoplastic binder in a proportion of 45% of weight and a thermosetting binder in a proportion of 10% of weight, and comprising a further component, serving to give the preshaped element a required density, in a proportion of 20% of weight.

4. The preshaped abrasive element of claim 1, serving as a substitute for a porcelain ceramic element, **characterized in that** it comprises an abrasive component or a mixture of abrasive components in a proportion of 55% of weight, dispersed in both a thermoplastic binder in a proportion of 35% of weight and a thermosetting binder in a proportion of 5% of weight, and comprising a further component, serving to give the preshaped element a required density in a proportion of 5% of weight.

Patentansprüche

1. Ein vorgeformtes Schleifelement zur Oberflächenveredlung, Gleitschleifen, Vibrationsschleifen und ähnliche Anwendungen, umfassend mindestens eine Schleifkomponente oder eine Mischung von Schleifkomponenten, verteilt in sowohl einem ther-

moplastischen Bindemittel als auch einem wärmehärtendem Bindemittel, wobei das vorgeformte Schleifelement die Schleifkomponente oder eine Mischung von Schleifkomponenten in einem Anteil von 25 Gew.-% bis 55 Gew.-% umfasst, verteilt in sowohl dem thermoplastischen Bindemittel in einem Anteil von 35 Gew.-% bis 55 Gew.-% als auch in dem wärmehärtendem Bindemittel in einem Anteil von 5 Gew.-% bis 10 Gew.-% wobei das vorgeformte Schleifelement zudem eine weitere Komponente umfasst, die aus der Gruppe, bestehend aus Baryt, Siliziumcarbid, Feldspat, Glashohlkugeln und Zirkon ausgewählt ist, wobei die zusätzliche Komponente dazu dient, dem vorgeformten Element eine benötigte Dichte zu verleihen, in einem Anteil von 5 Gew.-% bis 20 Gew.-%.

2. Das vorgeformte Schleifelement gemäß Anspruch 1, wobei dieses als ein Ersatzmittel für ein Polyester-Kunststoffbindemittel oder ein Harnstoff-Kunststoffbindemittel dient, **dadurch gekennzeichnet, dass** dieses eine Schleifkomponente oder eine Mischung von Schleifkomponenten in einem Anteil von 40 Gew.-% umfasst, verteilt in sowohl einem thermoplastischen Bindemittel in einem Anteil von 40 Gew.-% als auch einem wärmehärtenden Bindemittel in einem Anteil von 5 Gew.-%, und eine zusätzliche Komponente umfasst, die dem vorgeformten Element eine benötigte Dichte verleiht, in einem Anteil von 15 Gew.-%.

3. Das vorgeformte Schleifelement gemäß Anspruch 1, wobei dieses als ein Ersatzmittel für ein keramisches Schleifelement einer bekannten Art dient, **dadurch gekennzeichnet, dass** dieses eine Schleifkomponente oder eine Mischung von Schleifkomponenten in einem Anteil von 25 Gew.-% umfasst, verteilt in sowohl einem thermoplastischen Bindemittel in einem Anteil von 45 Gew.-% als auch einem wärmehärtendem Bindemittel in einem Anteil von 10 Gew.-%, und eine zusätzliche Komponente umfasst, die dem vorgeformten Element eine benötigte Dichte verleiht, in einem Anteil von 20 Gew.-%.

4. Das vorgeformte Schleifelement gemäß Anspruch 1, wobei dieses als ein Ersatzmittel für ein Porzellan-Keramik-Element dient, **dadurch gekennzeichnet, dass** dieses eine Schleifkomponente oder eine Mischung von Schleifkomponenten in einem Anteil von 55 Gew.-% umfasst, verteilt in sowohl einem thermoplastischen Bindemittel in einem Anteil von 35 Gew.-% als auch einem wärmehärtendem Bindemittel in einem Anteil von 5 Gew.-%, und eine zusätzliche Komponente umfasst, die dem vorgeformten Element eine benötigte Dichte verleiht, in einem Anteil von 5 Gew.-%.

Revendications

1. Elément abrasif préformé pour la tribofinition de surfaces, la finition au tonneau, la vibrofinition et des applications similaires, comprenant au moins un composant abrasif ou un mélange de composants abrasifs, dispersé à la fois dans un liant thermoplastique et dans un liant thermodurcissable, dans lequel l'élément abrasif préformé comprend le composant abrasif ou le mélange de composants abrasifs en une proportion de 25 % à 55 % en poids, dispersé à la fois dans le liant thermoplastique en une proportion de 35 % à 55 % en poids et dans le liant thermodurcissable en une proportion de 5 % à 10 % en poids, dans lequel
l'élément abrasif préformé comprend aussi un autre composant choisi dans le groupe constitué de la barite, du carbure de silicium, du feldspar, des sphères en verre creuses et du zircon, l'autre composant servant à donner à l'élément préformé une densité requise, en une proportion de 5 % à 20 % en poids.

2. Element abrasif préformé selon la revendication 1, servant de produit de remplacement d'un liant plastique de type polyester ou d'un liant plastique uréique, **caractérisé en ce qu'**il comprend un composant abrasif ou un mélange de composants abrasifs en une proportion de 40 % en poids, dispersé à la fois dans un liant thermoplastique en une proportion de 40 % en poids et dans un liant thermodurcissable en une proportion de 5 % en poids, et comprenant un autre composant servant à donner à l'élément préformé une densité requise, en une proportion de 15 % en poids.

3. Element abrasif préformé selon la revendication 1, servant de produit de remplacement d'un élément abrasif en céramique de type connu, **caractérisé en ce qu'**il comprend un composant abrasif ou un mélange de composants abrasifs en une proportion de 25 % en poids, dispersé à la fois dans un liant thermoplastique en une proportion de 45 % en poids et dans un liant thermodurcissable en une proportion de 10 % en poids, et comprenant un autre composant servant à donner à l'élément préformé une densité requise, en une proportion de 20 % en poids.

4. Element abrasif préformé selon la revendication 1, servant de produit de remplacement d'un élément abrasif en porcelaine, **caractérisé en ce qu'**il comprend un composant abrasif ou un mélange de composants abrasifs en une proportion de 55 % en poids, dispersé à la fois dans un liant thermoplastique en une proportion de 35 % en poids et dans un liant thermodurcissable en une proportion de 5 % en poids, et comprenant un autre composant servant à donner à l'élément préformé une densité requise, en une proportion de 5 % en poids.

REFERENCES CITED IN THE DESCRIPTION

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