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(54) Benævnelse: **Fremgangsmåde til i det mindste kvalitativ bestemmelse af mindst en fysisk og/eller kemisk egenskab ved et laminatpanel**

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Method for the qualitative determination of at least one physical and/or a chemical property of a laminate panel

Description

[0001] The invention relates to a method for the at least qualitative determination of at least one physical and/or chemical property of a laminate panel by means of a mobile radio device, and to a corresponding mobile radio device.

[0002] In many sectors, the physical and/or chemical properties of a laminate panel are at least included in the crucial factors for a customer's purchase decision. These physical properties can, for example, be a thermal insulating property or a sound insulating property. The screening of electromagnetic fields can also be such a deciding physical property for the purchase.

[0003] The chemical properties that can affect a customer's purchase decision include in particular the outgassing properties of a laminate panel. Depending on the materials used in the manufacture of the laminate panel, it is possible that particular substances, formaldehyde for instance, outgas from the laminate panels. Since these substances can be harmful to health, the question of the extent to which these substances are emitted by the laminate panels is of great interest to customers. Other substances can, of course, emerge from the laminate panel. These particularly comprise organic substances such as, for example, the volatile organic compounds (VOCs), but also other substances that in some cases may be more or less harmful to health.

[0004] A large number of different requirements must, for example, be satisfied and properties exhibited by laminate flooring nowadays. If, for example, a laminate floor is laid in a room, then when this floor is walked on, room noise or walking noise results and is perceptible in the room in which the laminate floor has been laid. Footstep noise, which can be perceived in a room located underneath this room, also arises. The room noise or walking noise and footstep noise should here be as slight as possible in order for the noise to cause as little stress to the inhabitants as possible.

[0005] Laminate floors and laminate panels are composite materials which preferably comprise an internal carrier board as well as coatings on the large-area upper side and underside. For this purpose, wood-based boards such as, for example, high density fibreboards (HDF) are conventially used as carrier boards. The surfaces of these HDF boards are finished by various methods in order to achieve the desired product properties, for example resistance to abrasion, resistance to scratching, resistance to external impact forces and the like. Depending on the usage class in accordance with EN 13329, more or less strict requirements are placed on the product surface and on the material as a whole, in particular in respect of the properties mentioned above.

[0006] Laminate panels and laminate floors include a decorative layer which is either applied directly to the material, for example by direct printing, or is applied in advance to a décor paper that is to be applied. Such a décor paper in turn either may or may not be impregnated by a resin at the time of application. In the case of direct printing in which the decoration is printed directly onto the carrier board, this may be done, following suitable pre-treatment of the surface of the carrier board, through indirect intaglio printing or by means of digital printing.

[0007] The surface may also be sealed by different methods. Paint systems that harden, for example, by means of UV radiation, electron radiation, or auto-catalytically, or resins may be used. Different paint systems may be used here, depending on the requirements and the technology in use.

[0008] Melamine resins are usually used for sealing the surface by means of resins, and are, for example, applied to the surface that is to be sealed as overlay paper, liquid overlay or as a powder overlay. Usually they are hardened in short-cycle presses through the influence of temperature and pressure.

0009] The underside of the carrier board can be sealed using a simplified method, but in principle through the use of the same technologies as the decorative upper side. A counter layer can also be applied to the underside in order to reduce the internal stresses in the laminate panel or in the floor laminate that result from the coating of the upper side.

[0010] The finishing of the sides of the carrier board is normally done on half-sized boards with edge lengths of, for example, 2800 x 2070 mm. According to the equipment in use, what is known as a multiple length can also be used having, for example, twice or three times the length of such half-sized boards.

[0011] In the course of the further processing, the boards are then cut into individual panels to which, in order to join the sides of individual panels into a composite laid surface, connecting means having, for example, a tongue and groove structure with locking elements are applied, either being carved as one piece out of the carrier material, or being present as a separate component.

[0012] The laminate panels manufactured in this way are packed in small numbers into packages, so that often a part of the decorative surface of the laminate panels is visible.

[0013] Laminate flooring coated in melamine resin usually exhibits two marked properties. Firstly, a significant loss of volume occurs during hardening as the result of a condensation process. This results in significant tensions in the melamine resin layer, so that in the presence of mechanical excitations, the noises described above occur along with audibly perceptible vibrations. In addition, melamine resins, in comparison, for example, with other synthetic resins, exhibit a raised thermal conductivity, so that the floor, for example when walked on in bare feet, is perceived as cold, since the heat of the body is strongly dissipated by the melamine resin. Other synthetic resins, or the paints and paint systems used in the manufacture of laminate panels, exhibit a lower thermal conductivity when compared with melamine resin, so that a floor consisting of laminate panels manufactured with these materials is perceived as less cold.

[0014] A method and a measuring instrument for determining the heat penetration capability or the heat penetration resistance is known from DD 0152 422, in which the measuring instrument with a plane heating surface is placed on the item under test. The changed contact temperature is evaluated by means of thermocouples.

[0015] It is, however, disadvantageous that the customer, for example in a shop specializing in objects of this type such as laminate flooring panels, is not personally able to determine or check these physical and/or chemical properties, and is thus unable to compare the properties of different products which may be from different manufacturers against each other. The customer must often rely on vague advertising statements such as, for example, "good sound damping properties", which make a comparison between different products impossible. This is made yet more difficult in that it is precisely the properties of this sort, which are difficult to record objectively due to the highly subjective aspect of their perception, that are involved. Technical properties are often quoted, based, for example, on test certificates. For the layperson these are often unknown or incomprehensible, and such information is therefore often very little help to the end customer.

[0016] The invention is therefore based on the object of providing a method for the at least qualitative determination of at least one physical and/or chemical property of a laminate panel that can be carried out quickly, and without highly expensive equipment, directly at the laminate panel.

[0017] The invention achieves the stated object through a method for the at least qualitative determination of at least one physical and/or chemical property of a laminate panel by means of a mobile radio device, wherein the method comprises the following steps:

a) arranging the mobile radio device on a surface of the laminate panel,

b) measuring at least one physical and/or chemical measurement variable by means of a measuring instrument which is integrated into the mobile radio device or connected to the mobile radio device, and

c) at least qualitative determination of the at least one physical and/or chemical property on the basis of the at least one measured physical and/or chemical measurement variable.

[0018] Today's mobile radio devices, in particular smartphones, can execute a large number of different functions that are facilitated by measuring instruments integrated into the mobile radio device. Measuring instruments can here be present as individual

sensors or measurement detectors, or as measuring chains consisting of a plurality of elements comprising, for example, a measurement converter or a computing device. In the method according to the invention, these measuring instruments are employed in order to measure at least one physical and/or chemical measurement variable of the laminate panel, and on the basis of the measurements obtained in this way, to determine at least qualitatively the at least one desired physical and/or chemical property. It is only necessary to place the mobile radio device onto the surface of the laminate panel for this purpose. The region in which the mobile radio device is arranged on this surface, and in which the mobile radio device comes into contact with the surface, i.e. which it covers or overlays, is referred to below as the supporting face. Advantageously here the mobile radio device, in particular the smartphone, is arranged on the surface of the laminate panel in such a way that it is arranged with the side that faces away from the display of the mobile radio device on the laminate panel. This is in particular simply enabled in that the mobile radio device, in particular the smartphone, is placed onto the surface of the laminate panel with the side that faces away from the display.

[0019] The measurement of the physical and/or chemical measurement variable is carried out by a program that is, for example, stored in the data memory of the mobile telephone, a so-called "app".

[0020] It has found to be particularly advantageous if the physical and/or chemical measurement variable is measured repeatedly at different times. In this way, for example, the change of the measurement variable over time can be determined, and from that, the physical and/or chemical property can be determined at least qualitatively. In this way it is also possible for transport variables, such as for example thermal conductivity and sound transmission properties, to be determined for example on the basis of the change in the temperature or sound over time.

[0021] Preferably the method steps a) and b) are carried out for different laminate panels, and the qualitative determination of the physical and/or chemical properties takes place through a comparison of the measurement variables measured at the different laminate panels. This is particularly helpful for cases in which, for example, a

precise numerical value for the physical and/or chemical property is not required, but in which only the physical and/or chemical property of a plurality of laminate panels, which can for example be flooring laminate panels from different manufacturers, are to be compared. As a result through this method the customer is himself able to determine easily and quickly at the sales outlet, which of the laminate panels exhibits, for example, the best thermal insulation, footstep noise attenuation or the screening of electromagnetic fields, or has the lowest emission values for various substances, for example formaldehyde or volatile organic compounds (VOCs). The exact numerical value is here often of no interest, but rather, for example, only the relationship of these measurements to one another, so that the comparison of the different laminate panels is sufficient for the customer to reach a purchase decision.

[0022] It is, of course, also possible to carry out the qualitative determination of the physical and/or chemical property by means of a comparison with values stored, for example, in the data memory of the mobile radio device. It may, for example, be imagined that the measurements, or the physical and/or chemical properties belonging to laminate panels that already exist and are available on the market, for example of flooring laminate panels from a manufacturer, are stored in the data memory of the mobile radio device, in particular of the smartphone. This data is preferably made available by an app. If a physical and/or chemical measurement variable is now measured, it is possible, for example, for the physical and/or chemical property that is of interest in the particular case to be determined qualitatively from this through a comparison with the stored values. In this way, even in the case in which only one laminate panel is available to the user of the method, it is possible to determine qualitatively whether this laminate panel exhibits, for example, a better sound insulation property than other laminate panels that are available on the market but which are not, for example, currently available in the shop. In this way the quality of a laminate panel in relation to the quality of other laminate panels can be determined, without these having to be present.

[0023] Preferably the physical measurement variable is the temperature of the laminate panel at the supporting face, and the measuring instrument that is integrated into the mobile radio device or connected to the mobile radio device is a thermometer.

Smartphones in particular, but also other mobile radio devices, have an integrated thermometer in order to be able to give the user the current temperature on request. This thermometer can be used in order, for example, also to determine the temperature of the laminate panel at the supporting face.

[0024] This temperature can, for example, also be determined without contact, in that, for example, the smartphone comprises an integrated pyrometer for contactless temperature measurement. In order to be able to achieve the most reliable and reproducible measurement of the temperature possible, care should be taken to see that air movements that can arise, for example, as a result of drafts, are avoided, since these can have an influence on the temperature measurements. The same applies to the ambient temperature, which can in particular advantageously be determined and measured beforehand by the thermometer of the mobile radio device. In this way other environmental factors that can have an effect on the measurement can be eliminated or can be determined and incorporated into the measurement or the later evaluation of the measured values.

[0025] Advantageously a thermal conductivity and/or a thermal insulating capability of the laminate panel is determined from the temperature measured at different times. For this purpose, the temperature of the laminate panel can preferably be increased prior to the measurement of the temperature. This can preferably be done at the supporting face. A temperature increase at a predetermined distance from the supporting face can, however, also be used. After the temperature at this location has been increased, it is possible, using the thermometer integrated into the mobile radio device to determine the temperature at a sequence of different times, so that the cooling of the laminate panel at the supporting face can be tracked and documented. Material properties such as, for example, the thermal conductivity and/or the thermal insulating capability of the laminate panel can be determined from this decay behaviour.

[0026] Advantageously the temperature at the supporting face of the surface of the object is raised by a temperature rise in the mobile radio device. This can, for example, be achieved in that an electrical resistor integrated into the mobile radio device is used

in order to generate heat, by means, for example, of a current passed through it. Other possibilities can, of course, be conceived for introducing heat into the surface of the laminate panel, in that a function of the mobile radio device is used. Thus for example a program can be executed in the mobile radio device which leads, for example, to heating of the data processing unit, through which the surface of the laminate panel at the supporting face is also heated. As a result of the increased temperature inside the mobile radio device, heat is introduced into the supporting face of the surface, causing it to heat up.

[0027] After the heating of the surface has been completed, the temperature is measured at different times, and in this way the cooling of the supporting face of the laminate panel is documented.

[0028] The opposite path is, of course, also possible. Instead of first heating the supporting face of the surface of the laminate panel and then documenting the cooling process through multiple measurements of the temperature, it is also possible to measure the temperature at different times during the warming of the supporting face of the surface of the laminate panel. In order in this way to determine the thermal insulating capability and/or the thermal conductivity and/or the thermal capacity of the laminate panel concerned not only qualitatively but also quantitatively, it is necessary to know how much heat is developed in the respective manner and introduced into the surface. On the basis of this quantity of heat developed and introduced into the surface and of the course of the temperature during the heating process, it is then possible to determine the desired variables.

[0029] But even in the case in which the quantity of heat is not known, it is also possible with this method to establish, for example, a comparison between different laminate panels. For this purpose the method is carried out at different laminate panels one after another, wherein the heating process by the function of the mobile radio device that is utilized takes an identical course for all the laminate panels. Even if the actual numerical values of the quantities of heat introduced in this way into the surface are not known, it can nevertheless be assumed that the same quantity is introduced into the surfaces of the individual laminate panels, so that the thermal capacities and/or

thermal insulating capabilities or thermal conductivities of the individual laminate panels determinable from this can easily be compared with one another.

[0030] Regardless of the manner in which the temperature of the respective laminate panel is determined, care should preferably be taken to ensure that the external parameters such as, for example, the ambient temperature and, for example, air movements, are identical or at least very similar for the measurement at each laminate panel, in order to be able to ensure comparability of the results.

[0031] It is, of course, also possible to cause the increase in temperature at the supporting face of the surface of the laminate panel through a method other than an increase in the temperature of the mobile radio device. As an alternative to this, it has been found advantageous if the temperature is increased by placing a hand on the supporting face or at a predetermined distance from it for a predetermined period of time before the mobile radio device is arranged on the supporting face. It is, however, advantageous here if both the predetermined period of time and the period of time that passes until the mobile radio device is arranged on the supporting face of the surface is maintained as precisely as possible in order for the results to be reproducible. This is in particular necessary if this method is to be carried out for different laminate panels and the results that are then obtained are to be compared.

[0032] In order to be able to maintain and measure this predetermined period of time as precisely as possible, the mobile radio device for example can indicate, for example on the display, the time that has already passed or which still remains. This can, for example, be done in the form of a countdown.

[0033] In one special embodiment of this method, only the starting temperature prior to placing the hand on the supporting face of the laminate panel and the final temperature after the placement of the hand are determined by the thermometer of the mobile radio device. The temperature difference can in this way be calculated, and the physical property can be determined from that.

[0034] In addition to the physical properties determined from the temperature, such as

thermal conductivity and thermal capacity, the sound properties of flooring laminate panels in particular are of great significance to a customer's purchase decision.

[0035] Advantageously the physical measurement variable is the sound of an acoustic signal which is measured by means of a microphone which is integrated into the mobile radio device or connected to the mobile radio device, wherein the acoustic signal is generated in the laminate panel before the measurement of the sound. This is in particular helpful for floor coverings, flooring laminate panels for example, in order to determine the sound insulating or sound transmission properties of the respective floor covering and thus to determine the noise pollution from footstep noise or room noise.

[0036] In one advantageous embodiment, the acoustic signal is generated by a vibration function of the mobile radio device. Mobile radio devices, smartphones in particular, usually have a vibration function of this sort in order to draw the attention of the respective user of the mobile radio device to, for example, an incoming call even without an acoustic signal. After the mobile radio device has been arranged on the supporting face, this vibration of the mobile radio device with the vibration function switched on is transferred to the laminate panel, and thus an acoustic signal is generated in the laminate panel, or is excited or evoked in the laminate panel.

[0037] Alternatively or in addition to this, the acoustic signal can also be generated by knocking on an upper side and/or underside of the laminate panel at a predetermined distance from the supporting face. In this case, the mobile radio device is first arranged on the supporting face, after which the acoustic signal is generated in the laminate panel for example by knocking on the surface with a finger or with an object. It is advantageous here if the knocking is created at a predetermined distance, maintained as accurately as possible, from the supporting face of the laminate panel, in order to obtain a reproducible result. The noise or the acoustic signal in the laminate panel is measured using the microphone integrated into the mobile radio device. The loudness of the acoustic signal measured in this way allows properties such as, for example, the sound insulating property, to be determined. If the distance from the supporting face at which the acoustic signal was produced is known at the same time, conclusions can

also be drawn relating, for example, to the sound transmission property and the sound conductivity of the laminate panel.

[0038] An acoustic signal consists here of sound waves that can be described through their frequency and amplitude, i.e. their pitch and volume. The volume, and the change in the volume over time, of an acoustic signal are in particular of interest for the determination of sound transmission properties and sound insulation properties of a laminate panel. For that reason in the method described here the volume of the acoustic signal in particular is measured using in particular the microphone integrated into the mobile radio device, and the measurement so obtained is processed further. For special applications it can be helpful to perform this in, for example, a frequency-dependent manner. This means that, for example, a frequency-dependent sound insulating property is determined, in that either the excited or evoked acoustic signal only contains sound waves of a particular frequency or of a particular frequency band, or that only sound waves of particular frequencies are measured with the microphone that exists in the mobile radio device, while the sound waves with other frequencies are filtered out. This can, for example, be controlled by a particular software. Combinations of these two possibilities are also, of course, conceivable.

[0039] In the case of determining the sound properties, the method can also be carried out for different laminate panels in sequence, so that the results obtained in this way can be put in relation to one another and can be compared against each other. In this case again, the precise numerical value of, for example, the sound conductivity or the sound insulating property is often not of interest, but the purchase decision is often made depending only on a comparison of these properties for different laminate panels.

[0040] The generation of the acoustic signal by knocking on the upper side and/or underside of the laminate panel is advantageously performed at a distance of less than 10 cm, advantageously less than 8 cm, in particular less than 5 cm. In this case again, the volume of the sound or of the acoustic signal can be measured at a sequence of different times, so that, for example, the reverberations of the generated signal can be measured and detected. As with the measurement of the temperature above, it is also possible in the case of the measurement of the sound or of the acoustic signal for

reference values of existing products and laminate panels to be made available, for example by an app, and stored in the electronic data memory of the mobile radio device and used for comparison of the measured measurement variables or with the particular physical properties.

[0041] In this way a sound conductivity and/or a sound insulating property of the laminate panel can advantageously be determined from the sound measured at different times or from other measurement variables of an acoustic signal.

[0042] In addition to the temperature-dependent and sound-dependent physical and/or chemical properties, it can be advantageous for certain applications if the laminate panel is, for example, capable of screening magnetic fields.

[0043] Preferably the physical measurement variable is a magnetic field strength which is measured by a magnetometer that is integrated into the mobile radio device. The compass that is often integrated into mobile radio devices, in particular into smartphones, contains a magnetometer. This measures properties of the Earth's magnetic field, such as, for example, its direction, and in that way determines the compass direction at the time. The magnetometer contained for this purpose in the mobile radio device for measuring the magnetic field strength and the magnetic field direction is used in the present method in order to measure the magnetic field strength as a physical measurement variable. In order, for example, to determine the capacity of the laminate panel to screen magnetic fields, the magnetic field strength is measured once as a physical measurement variable when the mobile radio device is arranged on the supporting face of the laminate panel. A second measurement is performed when the mobile radio device is not arranged on the supporting face. The difference between the two magnetic field strengths is a measure of the capacity of the respective object to provide screening. In this case again, the actual numerical value of the magnetic field strength is often not of interest. Again in relation to the capacity to screen magnetic fields, the comparison between a plurality of laminate panels is much more important, so that the method is again in this case performed with a plurality of different laminate panels, and the screening capacities determined in each case can be compared with one

another. A comparative measurement without a laminate panel is not necessary for this purpose.

[0044] Whereas the direction of the Earth's magnetic field is determined for the compass function of the smartphone, in order thus to determine the magnetic north pole, it is in particular the strength of the magnetic field that must be determined, and put into relation to one another for different measurements, in order to carry out the method described here. For this purpose the laminate panels that are to be compared should be measured at the same location in order to achieve comparable results. If, for example, laminate panels are compared in different shops and stores, the different structural design of the respective building can lead to changed measurement results. If, for example, a cellar with, for example, a reinforced concrete ceiling is arranged underneath the store, this arrangement itself can screen the Earth's magnetic field, whereas, for example, in buildings without a cellar this is not true, or is true to a different extent. Without exact knowledge of these circumstances, comparability of the measurements is only possible with great difficulty or not at all. It is only in the case where the individual laminate panels are measured at the same location that the measurement results obtained in this way are comparable.

[0045] In particular for laminate panels that are to be used, for example, in habitable rooms as floor or wall covering, it is of great interest for the end customers to have knowledge of the chemical properties of such laminate panels.

[0046] Advantageously here during the measurement of the at least one physical and/or chemical measurement variable a quantity of a substance which is outgassed from the laminate panel is measured. This can, for example, be formaldehyde or a volatile organic compound (VOC). Other substances that may be outgassed from laminate panels are, of course, also conceivable.

[0047] In particular for substances that are harmful to health it is advantageous if the respective laminate panel emits the smallest possible quantity of this substance. Since the manufacturers of this kind of laminate panel therefore ensure that the quantity that is outgassed is a small as possible, it can be helpful, in order to increase the accuracy

of measurement of the method described here, for example to raise the temperature at least on the supporting face of the upper side of the laminate panel and thus also to temporarily increase the outgassed quantity of the respective substance. As a result, the quantity of the emitted substance that is to be measured is large enough for a reliable and accurate measurement to be possible. If at the same time the temperature on the supporting face of the upper side of the laminate panel is measured, it is again in this case possible to effectively compare different laminate panels which may come from different manufacturers against one another.

[0048] The physical and/or chemical properties described here, which can be determined with the method according to the invention, are only exemplary embodiments of the method described here. Further chemical and/or physical properties can in particular be determined.

[0049] In addition it is possible to determine a plurality of the said properties simultaneously, since the measuring instruments used in each case, which are present in the mobile radio device, often operate independently of one another and, in addition, the respective physical and/or chemical measurement variables do not affect each other, or even do so in an advantageous manner. As already presented, it can be advantageous for the determination of the quantity of an outgassed substance to also determine the temperature of the laminate panel, in particular at the supporting face. At the same time it could be possible for example for the magnetic field strength to be determined by the magnetometer. The different physical and/or chemical measurement variables do not affect one another. On the other hand, as a consequence of interfering vibrations that must be generated or evoked in the laminate panel, it may not be possible to combine a noise measurement, or the determination of the volume of an acoustic signal, with all the other measurements without having an effect on the determined measurement values for other properties.

[0050] Advantageously the mobile radio device is a smartphone and/or the laminate panel is a flooring panel. Even though the methods in this document described here were described for flooring panels, it is also conceivable that they are carried out for other panels. With the method described here it follows that different physical and/or

chemical properties of laminate panels can be determined quickly and easily by means of a smartphone, so that an expense of equipment is very small, and hardly any additional costs arise for the respective user.

[0051] The method according to the invention is of course not restricted to the embodiments described. Many mobile radio devices, in particular smartphones, include further measuring instruments with which a wide range of measurement variables can be recorded, and thereby various physical properties of laminate panels, can be determined. Today's mobile radio devices include, for example, a camera. With this it is possible to photograph and thus to record, for example, a decoration of a laminate panel in such a way that this decoration can, for example, easily be compared with other decorations that have been recorded from other laminate panels. A decoration detection in which it is, for example, established which wood is being imitated by the decoration is also possible. Data records of the wood grain and/or colours and colour distributions of the different types of wood should for this purpose be stored in the data memory of the mobile telephone, with which the photographed decoration can be compared.

[0052] With a decoration that has been photographed in this way it is also, for example, possible for the print quality, such as, for example, the resolution of the applied print to be checked, determined, and thus to be compared with the determined print quality of other laminate panels. A determination of the colour and a colour comparison of different decor recorded in this way is also possible. Laminate panels are often used for floors which are to be replaced when, for example, a room or a house is renovated. Existing furniture is often used again here, so that for aesthetic reasons it is helpful and desirable if the colour of the existing furniture harmonizes with the chosen decoration of the laminate panels. Choosing the same type of wood, or the imitation of the same type of wood, for furniture and laminate panels is often insufficient here, since here again large differences between, for example, the colouration and the structure of the decoration can be present. It is therefore possible with the app described here to photograph, for example, a piece of furniture, for example a cupboard or table, and to determine, for example, a predominant colour or a

colour temperature. The same can then be done with a laminate panel, so that the colours recorded in this way can be compared with one another.

[0053] In addition it is, for example, possible for the packages in which the laminate panels are packed, or even the laminate panels themselves, to incorporate chips, for example RFID chips. These react to transmitted electromagnetic radiation which can, for example, be sent out by the mobile radio device. The RFID chip is activated in this way and can transmit information, for example regarding product details, but also regarding availability, delivery times, or product locations in a store or a large warehouse, to the mobile telephone. In this way the smartphone or the mobile telephone can determine further information about the laminate panels.

[0054] A computer program with program code means is in particular stored on a machine-readable carrier and is set up for carrying out a method described here when the computer program executes on a data processing unit of a mobile radio device. This can in particular be the data processing apparatus of a smartphone. The computer program stored in the electronic data memory of the smartphone or of another mobile radio device, and can be started for example by an operating element which can, for example, be a touchscreen.

[0055] The computer program, which can be formed as what is known as an "app", can also be stored on a central server and made available, for example through download.

[0056] A mobile radio device, in particular a smartphone, comprises an integrated thermometer and/or an integrated microphone and/or an integrated magnetometer for example for a compass function and/or further measuring equipment and/or a camera and an electrical controller that is set up to carry out a method according to one of the above claims. A corresponding mobile radio device preferably has an electronic data memory and an electronic data processing apparatus. A program, a so-called "app", which can for example be downloaded at no charge or for a fee, is advantageously stored in the electronic data memory. This program is executed in the electronic data

processing apparatus of the mobile radio device, so that the methods described here can be carried out.

[0057] With a method according to the invention and/or a mobile radio device according to the invention, it follows that product-specific information for different laminate panels can easily be collected and saved. It can be used for processing in further programs or, for example, saved in a database. In this way it is possible, for example, for products that are assessed and investigated at different dealers to be compared to one another in peace at a later time, so that the purchase decision can be made on a better basis that is as objective as possible. Presence in the respective salesroom of one of the dealers is no longer necessary for this purpose.

[0058] After the program has been saved once on the mobile radio device, no further costs arise for the user. The manufacturer of appropriate laminate panels can for example also make the "app", i.e. the electronic data processing program, available at no charge, so that no additional charges at all arise for the user of the mobile radio device. The physical and/or chemical properties of the respective laminate panels which otherwise are hard for laypersons to grasp, can in this way be compared to one another in an easy, reliable and objective manner. It is no longer necessary to rely on the potentially vague and imprecise advertising claims from different manufacturers.

[0059] In principle a method of this sort is conceivable for any physical and/or chemical property of a laminate panel for which there is a corresponding physical and/or chemical measurement variable that can be measured by a measuring instrument integrated into the mobile radio device. To that extent the measurement variables referred to here of temperature, sound or volume and magnetic field strength, as well as the quantity of an outgassed or emitted substance such as for example formaldehyde or VOC, are to be seen as purely exemplary, and not as restrictive. The provision of separate measuring instrument modules for smartphones or for other kinds of mobile radio device is also conceivable; said modules could be connected to the mobile radio device over suitable data interfaces so that the method can be carried out even for physical and/or chemical properties that are not accessible through a measuring instrument that has been integrated by the manufacturer into the mobile

radio device. In the context of the present invention, measuring instruments of this sort are also to be seen as being integrated into the mobile radio device. The only important thing is that the measurements of a physical and/or chemical measurement variable recorded by a measuring instrument can be transmitted to the mobile radio device and processed further in it.

[0060] The respective measurement of the corresponding physical and/or chemical measurement variable can here be performed at a time delay after activation of the "app" in the mobile radio device, in order to exclude operating effects.

[0061] An exemplary embodiment of the present invention is explained in more detail below with the help of a drawing. Here:

Figure 1shows a schematic illustration of a mobile radio device at a laminate panel.

[0062] Figure 1 shows a laminate panel 2 that consists of a plurality of different layers. The laminate panel 2 has a carrier board 4 on the surface of which for example a decorative layer 6 and on top of that an abrasion-resistant layer 8 are arranged. The abrasion-resistant layer 8 forms a surface 10 of the laminate panel. A counter layer 12 is arranged on the side of the carrier board 4 opposite to the decorative layer 6. This counter layer 12 prevents an upper side and an underside of the carrier board 4 being subjected to different tensile stresses due to the different layers that are applied. This would lead to warping of the laminate panel 2, known as dishing.

[0063] A mobile radio device 14 which has a display 16 is arranged on the surface 10 of the laminate panel 2. The mobile radio device 14 is arranged with the side that faces away from the display 16 on the surface 10 of the laminate panel 2. It is sufficient here for the mobile radio device 14 to be laid on the surface 10 of the laminate panel 2.

[0064] A data processing unit 18 and a data memory 20 are illustrated schematically inside the mobile radio device. A program, a so-called app, is stored in the data

memory 20 and enables the data processing unit 18 to carry out a method according to the present invention.

[0065] In the exemplary embodiment shown in Figure 1, a transmitter 22 is illustrated schematically, which evokes a change in state of a physical and/or chemical property, suggested by a first arrow 24, in the laminate panel 2. This can, for example, be a sound signal which is evoked by a vibration unit, or an increase in temperature evoked for example by an electrical resistor through which electric current now flows. Other changes in state are, however, conceivable. These do not, of course, have to be generated by the mobile radio device 14.

[0066] The laminate panel 2 reacts to this change in state, which is suggested by a second arrow 26. This reaction of the laminate panel 2 is detected by a measuring instrument 28. If the change in state evoked by the transmitter 22 is for example a sound signal, the measuring instrument 28 is for example a microphone. If, for example, the temperature at a location in the laminate panel 2 is changed by the transmitter 22, the measuring instrument 28 is advantageously a thermometer. What is important is that the change in state evoked by the transmitter 22 can be detected with the measuring instrument 28. With the values determined in this way, the method can be executed in the data processing unit 18, and in this way the physical property of the laminate panel 2 can be loaded.

List of reference signs

[0067]

2	Laminate panel
4	Carrier board
6	Decorative layer
8	Abrasion-resistant layer
10	Surface
12	counter layer
14	Mobile radio device
16	Display
18	Data processing unit
20	Data memory
22	Transmitter
24	First arrow
26	Second arrow
28	Measuring instrument

PATENTKRAV

1. Fremgangsmåde til i det mindste kvalitativ bestemmelse af mindst en fysisk og/eller kemisk egenskab ved et laminatpanel (2) ved hjælp af et mobilradioapparat (14), hvor fremgangsmåden udviser følgende trin:

   a) at placere mobilradioapparatet (14) på en overflade (10) af laminatpanelet (2),
   b) at måle mindst en fysisk og/eller kemisk målestørrelse ved hjælp af et i mobilradioapparatet (14) integreret eller med mobilradioapparatet (14) via passende datagrænseflader forbundet måleinstrument (28) og
   c) i det mindste kvalitativt at bestemme den mindst ene fysiske og/eller kemiske egenskab ud fra den målte mindst ene fysiske og/eller kemiske målestørrelse.

2. Fremgangsmåde ifølge krav 1, **kendetegnet ved**, at den mindst ene fysiske og/eller kemiske målestørrelse måles flere gange på forskellige tidspunkter.

3. Fremgangsmåde ifølge krav 1 eller 2, **kendetegnet ved**, at trinene a) og b) gennemføres for forskellige laminatpaneler (2), og den kvalitative bestemmelse af den mindst ene fysiske og/eller kemiske egenskab finder sted ved sammenligning af de ved forskellige laminatpaneler (2) målte fysiske og/eller kemiske målestørrelser.

4. Fremgangsmåde ifølge krav 1, 2 eller 3, **kendetegnet ved**, at den målte fysiske målestørrelse er temperaturen af laminatpanelet (2) på en støtteflade, hvorpå mobilradioapparatet er i kontakt med overfladen (10), og at det i mobilradioapparatet (14) integrerede eller med mobilradioapparatet (14) forbundne måleinstrument (28) er et termometer.

5. Fremgangsmåde ifølge krav 4, **kendetegnet ved**, at der ud fra den på forskellige tidspunkter målte temperatur af laminatpanelet (2) bestemmes en varmeledningsevne og/eller varmeisoleringsevne for laminatpanelet (2).

6. Fremgangsmåde ifølge et af de ovenstående krav, **kendetegnet ved**, at en tempera-

tur af laminatpanelet (2) øges ved støttefladen inden målingen af den mindst fysiske og/eller kemiske målestørrelse.

7. Fremgangsmåde ifølge krav 6, **kendetegnet ved**, at temperaturen af laminatpanelet (2) ved støttefladen øges ved en temperaturøgning i mobilradioapparatet (14).

8. Fremgangsmåde ifølge krav 6 eller 7, **kendetegnet ved**, at temperaturen ved støttefladen på laminatpanelet (2) øges ved at lægge en hånd på støttefladen i en forudbestemt periode, inden mobilradioapparatet (14) placeres på støttefladen.

9. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved**, at den målte fysiske målestørrelse er lyden af et akustisk signal, der måles ved hjælp af en i mobilradioapparatet (14) integreret eller med mobilradioapparatet (14) forbundet mikrofon, idet det akustiske signal frembringes i laminatpanelet (2) inden målingen af lyden.

10. Fremgangsmåde ifølge krav 9, **kendetegnet ved**, at det akustiske signal frembringes med en vibrationsfunktion i mobilradioapparatet (14).

11. Fremgangsmåde ifølge krav 9 eller 10, **kendetegnet ved**, at det akustiske signal frembringes ved at banke på en overside og/eller underside af laminatpanelet (2) i en forudbestemt afstand fra støttefladen.

12. Fremgangsmåde ifølge krav 10 eller 11, **kendetegnet ved**, at der ud fra den på forskellige tidspunkter målte lyd bestemmes en lydledningsevne og/eller lydisoleringsevne for laminatpanelet (2).

13. Fremgangsmåde ifølge et af de foregående krav, **kendetegnet ved**, at der ved målingen af den mindst ene fysiske og/eller kemiske målestørrelse måles en mængde af en substans, der udgasses fra laminatpanelet (2).

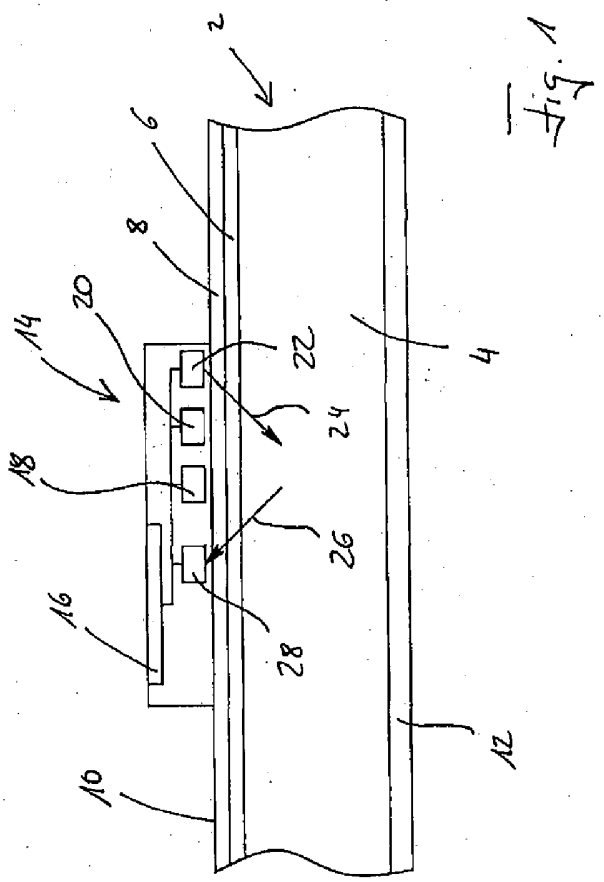

Fig. 1