



# **FEDERAL SUPREME COURT**

## **IN THE NAME OF THE PEOPLE**

### **JUDGMENT**

X ZR 44/20

Published on:  
April 26, 2022  
Anderer  
court clerk as  
clerk of the  
court registry

in the patent nullity case

Reference book:    yes  
BGHZ:               no  
BGHR:               yes

Composite element

PatG § 14

The fact that a patent is distinguished from a citation in the description by a specific feature of the patent claim can only lead to a restrictive interpretation if it is recognizable to which specific embodiment the distinction refers (supplement to BGH, judgment of March 2, 2021 - X ZR 17/19, GRUR 2021, 945 - Schnellwechseldorn; judgment of November 27, 2018 - X ZR 16/17, GRUR 2019, 491 - Scheinwerferbelüftungssystem).

BGH, judgment of April 26, 2022 - X ZR 44/20 - Federal Patent Court

ECLI:DE:BGH:2022:260422UXZR44.20.0

The X. Civil Senate of the Federal Court of Justice, at the oral hearing on April 26, 2022, by the Presiding Judge Dr. Bacher, Judges Hoffmann and Dr. Deichfuß, Judge Dr. Kober-Dehm, and Judge Dr. Crummenerl

found to be right:

On appeal, the judgment of the 3rd Senate (Nullity Senate) of the Federal Patent Court of January 28, 2020, is amended.

The action is dismissed.

The plaintiff shall bear the costs of the proceedings.

By law

Facts:

- 1 The defendant is the owner of European patent 1 516 720 (patent in suit), which was granted with effect for the Federal Republic of Germany, was applied for on August 7, 2004, claiming a German priority of September 19, 2003, and relates to the manufacture of a composite element using a polyurethane adhesion promoter. Patent claim 1, to which two further claims are referred back, reads in the language of the proceeding:

Method of manufacturing a composite element composed of the layers

- i) of a first top layer,
- ii) of a reactive adhesion promoter layer containing polyurethane with a density of 400 to 1200 g/l,
- iii) of a foam layer containing polyisocyanurate with a density of 30 to 100 g/l,
- iv) of optionally a second reactive adhesion promoter layer containing polyurethane having a density of 400 to 1200 g/l, and comprising the steps:
  - v) of a second covering layer comprising the steps:
    - A) Providing a first top layer,
    - B) application of reactive polyurethane adhesion promoter, as a liquid - reaction mixture, to the first top coat,
    - C) application of polyisocyanurate reaction mixture to the still reactive - adhesion promoter layer and foaming of the polyisocyanurate reaction mixture,
    - D) if necessary, applying a second adhesion promoter layer to the second top layer, and
    - E) application of the second top layer provided with reacting polyurethane adhesion promoter to the polyisocyanurate layer.

- 2 Claim 4, to which four further claims are referred back, protects a composite element obtainable by such a process, claim 9 the use of a reactive coupling agent for improving the adhesion between the layers of a composite element containing a polyisocyanurate foam.

3           The plaintiff argued that the subject matter of the patent in suit went beyond  
the content of the documents originally filed and was not patentable. The  
defendant defended the patent in suit as granted and, in the alternative, in eight  
amended versions.

4           The Patent Court declared the patent in suit to be invalid. This is the subject of  
the defendant's appeal, which continues to defend the patent in suit in the version  
granted and, in the alternative, in three further amended versions. The plaintiff  
opposes the appeal.

Reasons for Decision:

5           The admissible appeal is well-founded and leads to the dismissal of the  
action.

6           I.       The patent in suit relates to the manufacture of a composite element  
using a polyurethane adhesion promoter.

7           1.       According to the statements in the patent in suit, both polyurethane  
systems (PUR systems) and polyisocyanurate systems (PIR systems) are used  
for the production of composite elements for thermal insulation.

8           In PUR systems, flammable substances such as pentanes would be used  
as blowing agents due to the ban on chlorofluorocarbons. Fire protection  
requirements could therefore only be met to a limited extent (para. 2).

9           In contrast, PIR systems exhibited good flame retardant properties even with  
a reduced flame retardant content - often desirable for technical reasons. However,  
PIR systems had poorer adhesion to most known surfaces than PUR systems (par.  
3). Structural elements with metallic facings would have to have an adhesion value

of at least 0.08 N/mm<sup>2</sup> to be approved for the construction industry. PUR systems would have adhesion values of 0.12 to 0.17 N/mm<sup>2</sup>. The adhesion values of PIR systems, on the other hand, are on average less than 0.1 N/mm<sup>2</sup> (para. 4).

10                    2.            Against this background, the patent in suit concerns the technical problem of providing a method of producing a composite element which exhibits good flame retardancy and good adhesion values even with a low content of flame retardants.

11                    3.            To solve the problem, the patent in suit in patent claim 1 proposes a method, the features of which can be divided as follows:

1. the method serves to manufacture composite elements.
2. The composite element is composed of:
  - 2.1 a first top layer (i);
  - 2.2 an adhesion promoter layer (ii),
    - 2.2.1 which is reactive
    - 2.2.2 and contains polyurethane,
    - 2.2.3 with a density of 400 to 1200 g/l;
  - 2.3 of a foam layer (iii),
    - 2.3.1 which contains polyisocyanurate,
    - 2.3.2 with a density of 30 to 100 g/l;
  - 2.4 if necessary, a second adhesion promoter layer (iv),
    - 2.4.1 which is reactive
    - 2.4.2 and contains polyurethane,
    - 2.4.3 with a density of 400 to 1200 g/l;
  - 2.5 of a second top layer (v).
3. The procedure includes the following steps:
  - 3.1 provide a first surface layer (A);
  - 3.2 application of reactive polyurethane adhesion promoter, as a liquid reaction mixture, to the first top layer (B);
  - 3.3 applying a polyisocyanurate reaction mixture to the still reactive adhesion promoter layer (C);

- 3.4 allow the polyisocyanurate reaction mixture to foam (C);
- 3.5 if necessary, apply a second adhesion promoter layer to the second surface layer (D);
- 3.6 application of the second topcoat with reacting polyurethane adhesion promoter to the polyisocyanurate layer (E).

12           4.     The subject matter of claims 4 and 9 is not subject to a different  
assessment.

13           The composite element protected in claim 4 is characterized by the -  
manufacturing process according to claim 1.

14           The use protected in patent claim 9 requires, corresponding to feature 3.3,  
that the polyurethane adhesion promoter is still reactive when the PIR reaction  
mixture is applied. The patent court rightly assumed that the different spelling in  
the patent specification (polyurettian, pvlyisocyanate) was due to an obvious  
spelling mistake and that the terms actually intended (polyurethane,  
polyisocyanurate) are therefore decisive for the interpretation of claim 9.

15           Contrary to the plaintiff's view, this applies not only with regard to those word  
elements which already grammatically do not make sense, but also with regard to  
the element "cyanate". Neither from the patent claims nor from the other content  
are there any indications that patent claim 9 contains different requirements with  
respect to the foam used than the other claims. This leads to the conclusion that  
the indication "cyanate" is also based on a technical oversight and must therefore  
be understood as "cyanurate".

16           5.     Some features require further consideration.

17           a)       Characteristics group 2 contains specifications for the individual  
layers.

18           aa)     For the two surface layers (i, v), no specific material is preseen.

19           According to the description, all commonly used flexible and rigid materials  
can in principle be used, preferably metals, in particular aluminum or steel (para.  
10). However, patent claim 1 does not contain any specifications in this respect.

20           bb)     The foam layer (iii) contains, according to features 2.3.1 and 2.3.2,  
polyisocyanurate with a more closely defined density.

21           According to the description, known PIR foam can be used, which is  
obtainable by reacting polyisocyanates with compounds reactive to isocyanates  
in the presence of isocyanurate catalysts. The ratio of the two components in the  
reaction mixture is given as 1.8 to 8 to 1, and preferably 1.9 to 4 to 1 (para. 17).  
This detailed information has not been reflected in patent claim 1.

22           cc)     The adhesion promoter layer (ii) is reactive according to feature  
2.2.1 and contains polyurethane of more closely defined density according to  
features 2.2.2 and 2.2.3.

23           According to the description, polyurethane-based adhesion promoters  
known from the prior art can be used, which are obtainable by reacting  
polyisocyanates with compounds containing two hydrogen atoms reactive  
towards isocyanates.

24           The ratio between the polyisocyanate component and the compound  
containing reactive hydrogen atoms in the reaction mixture is given in the  
description as 0.8 to 1.8 to 1 and preferably as 1 to 1.6 to 1 (para. 11). This detailed

information on the nature and quantitative ratio of the components of the adhesion promoter layer has not been reflected in patent claim 1.

25           As reactive compounds suitable for the preparation of an adhesion promoter within the meaning of feature 2.2.2, the patent specification in dispute does not only list those with two or more OH groups (polyols) which, when reacted with a polyisocyanate, lead to the formation of polyurethanes in the narrower sense. Rather, compounds with two or more SH, NH, NH<sub>2</sub> or CH acid groups are also described as suitable (paragraph 13). It follows from this, as the Patent Court stated without being challenged in this respect, that the term "polyurethane" within the meaning of feature 2.2.2 is to be interpreted broadly and also includes, for example, polyurea which is formed by reaction of a polyisocyanate with the hydrogen atoms of NH<sub>2</sub> groups.

26           b)     The adhesion promoter layer and the way it is used are of decisive importance for the process defined in feature group 3 and for the adhesive properties of the composite element.

27           aa)    According to the description, the adhesion promoter layer with a polyurethane-based adhesion promoter leads to improved adhesion between the PIR foam layer and the top layer (par. 6 and par. 28).

28           bb)    Feature 3.2 concretizes the requirement already provided in feature 2.2.1 that the adhesion promoter layer must be reactive, to the effect that the reactive polyurethane adhesion promoter must be applied to the first top layer as a liquid reaction mixture.

29           It follows from this that the adhesion promoter must be applied as a mixture of at least two components which react with each other during application and for a certain period thereafter, thus forming the polyurethane-containing adhesion promoter layer. Suitable starting materials are the polyisocyanates and polyols mentioned by way of example in the description, from whose reaction polyurethane is formed.



30                   cc)    According to feature 3.3, the foam layer must also be applied in  
the form of a reaction mixture.

31                   This requires a mixture of at least two substances, the reaction of which  
produces a foam layer of polyisocyanurate. According to the description,  
polyisocyanates and polyols are also suitable starting materials (para. 19),  
provided that a catalyst is additionally used which leads to the formation of  
isocyanurate groups (para. 18).

32                   dd)    Feature 3.3 further provides that the adhesion promoter layer is  
still reactive at the time the PIR reaction mixture is applied.

33                   (1)    According to the description, the adhesion promoter layer is  
reactive if the polyurethane reaction of the adhesion promoter has not yet been  
completed (par. 29). At this stage, the adhesion promoter layer is not yet fully  
cured (par. 23). This procedure, which is only described as preferred (par. 29) or  
particularly preferred (par. 23) in the description, but which is mandatory in patent  
claim 1, ensures that the adhesion promoter layer still reacts with the PIR reaction  
mixture (par. 23).

34                   It can be inferred from these functional details that the remaining reactivity  
must not only allow the further formation of polyurethane, but also a reaction  
between the two mixtures for the adhesion promoter layer and the foam layer. In  
any case, such a reaction is possible if, when the PIR reaction mixture is applied,  
the adhesion promoter layer still contains components that can also react with  
components of the PIR reaction mixture. In the example described in the  
description, where both mixtures contain polyisocyanates and polyols (par. 23), this  
condition is fulfilled as long as the reaction in the adhesion promoter layer is not yet  
completely finished.

35                   (2)    The patent court rightly decided that patent claim 1 does not  
contain any fixed specifications as to the extent to which reactive components  
must still be present in the adhesion promoter layer.

36                   (a)    However, it follows from the explanations of the function of  
feature 3.3 and from the objective pursued by the patent in suit, namely to improve  
the adhesion between the foam layer and the cover layer, that the reactivity must  
still be present to an extent that enables the desired degree of adhesion.

37                   However, no fixed limits can be derived from this, if only because patent  
claim 1 does not contain any binding specifications with regard to adhesion.  
Furthermore, there are also no fixed specifications with regard to the substances  
of which the two reaction mixtures consist and to the way in which these  
substances can react with each other and with the substances of the respective  
other mixture.

38                   Against this background, neither the patent claim nor the description  
provide any indication that the adhesion promoter layer must still be liquid when  
the PIR reaction mixture is applied and that the time limit for this is the attainment  
of the gel point.

39                   (b)    The detailed statements of the parties and their private experts on  
the response processes and the achievable results are not of decisive importance  
in this context.

40                   The patent in suit does not define any specific requirements in this  
respect. Rather, it is limited to the specification that the adhesion promoter layer  
must not yet be fully cured.

41                   (c)     For this reason, it can also be left open whether and to what extent  
reaction partners are still available inside the adhesion promoter layer for a reaction  
with components of the PIR reaction mixture after the gel point has been reached.

42                   As the appellant correctly points out, it is sufficient that reactive  
components are still available to a sufficient extent on the surface of the adhesion  
promoter layer to which the PIR reaction mixture is applied. The fact that this  
requirement cannot be met after the gel point has been reached is neither asserted  
nor otherwise evident. Contrary to the view of the appeal, the patent in suit does  
not require that as many reactants as possible be present and accessible or that a  
mixing zone be created.

43                   (d)     Contrary to the view of the appeal, feature 3.3 is not  
meaningless on the basis of this understanding.

44                   The fact that the reaction process is asymptotic, i.e. a degree of reaction  
of 100% can never be achieved from a theoretical point of view, may mean that  
the period of time within which the adhesion promoter layer can be regarded as  
still capable of reacting may be very long, depending on the circumstances.  
However, a practically relevant limit results from the objective that the application  
of the adhesion promoter layer must improve the adhesion between the foam  
layer and the top layer to a relevant extent. In this respect, too, the patent in suit  
does not contain any numerically specific requirements. However, an  
improvement of the adhesion to an extent that is of no significance for the  
intended use of the composite element produced is not sufficient.

45                   (e)     Contrary to the opinion of the appeal, no deviating assessment  
results from the explanations in the description of the international patent  
application 99/00559 (NK5).

46               The patent in suit states that in the process disclosed in NK5 for making  
a metal sandwich panel, the adhesion promoter is cured just before the PIR foam  
mixture is applied (para. 4).

47               It can be inferred from this that the patent in suit wishes to distinguish  
itself from NK5 by means of feature 3.3. According to the case law of the Senate,  
such delimitations can be of importance for the interpretation of the feature in  
question (BGH, judgment of March 2, 2021 - X ZR 17/19, GRUR 2021, 945  
marginal no. 22 - Schnellwechseldorn; judgment of November 27, 2018 - X ZR  
16/17, GRUR 2019, 491 marginal no. 19 - Scheinwerferbelüftungssystem).

48               In the case in dispute, however, the statements in question could at most  
lead to a narrower understanding of feature 3.3 if it were recognizable to which  
concrete process design the delimitation refers. Irrespective of the question still to  
be discussed as to whether NK5 anticipates or suggests the subject-matter of the  
patent in suit, the citation does not contain any further details as to the extent to  
which the adhesion promoter layer is already cured when the PIR reaction mixture  
is applied and in which aggregate state it should be.

49               c)       According to feature group 2.4, a second adhesion promoter layer  
may optionally be present. This is optionally applied to the second top layer in  
accordance with feature 3.5.

50               From these features, the patent court correctly concluded that feature  
3.6 is also optional insofar as it specifies that the second top layer is provided with  
reacting polyurethane adhesion promoter.

51               II.       The patent court essentially justified its decision as follows:

52                   The subject-matter of claim 1 and thus also the subject-matter of claims  
4 and 9 was not new compared to international patent application 99/00559  
(NK5).

53                   NK5 discloses metal sandwich panels having an inner face layer, a PIR  
foam core, a bonding agent layer, and a metal skin. The foam core and bonding  
agent layer would be applied in the form of a reaction mix. The density of the foam  
core is said to be 25.6 to 38.4 g/l and preferably 30.4 to 33.6 g/l. According to  
NK5, the adhesion promoter layer preferably consists of polyurea, but can  
alternatively also consist of polyurethane. Unfoamed polyurethane has a density  
in the range of 1200 g/l inherent in the material. Residual water, which acts as a  
blowing agent, can reduce the density to between 300 and 400 g/l.

54                   NK5 attributes the improved adhesion to the fact that terminal hydrogen  
atoms of the polyurea layer permit a chemical reaction with reactive groups of  
components of the (reaction) mixture forming the PIR foam. The person skilled in  
the art, usually a polymer chemist with a doctorate and several years of experience  
in the production and practical use of foam composite elements and knowledge of  
the necessary properties associated with them, would also apply this explanation  
to a layer of polyurethane.

55                   That the adhesion promoter layer is still reactive when the PIR mixture  
is applied can already be concluded from the indication that in one embodiment  
the adhesion promoter layer is applied to the inner surface of the metal skin  
shortly after this has been unrolled, smoothed and profiled and immediately  
before it is brought into the immediate vicinity of the inner cover layer and the  
PIR mixture is applied between them. Therefore, it can be left open how the  
following text passage is to be interpreted, according to which the process can  
be adapted, if necessary, in such a way that it is possible for the polyurethane

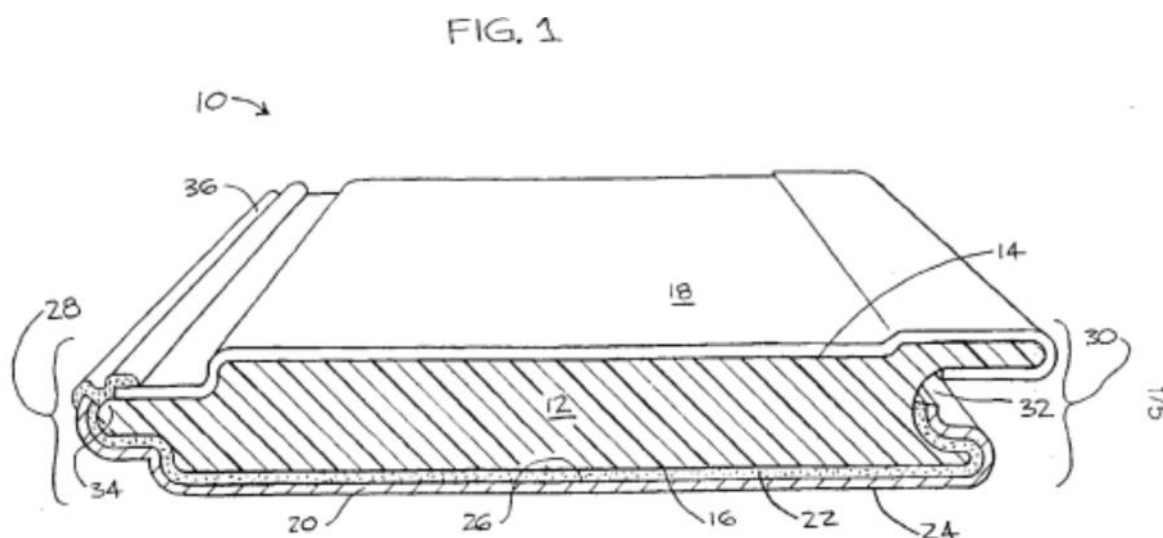
layer "to cure slightly before application of the polyisocyanurate foam mixture" NK5 did not contain any teaching regarding a certain suitable point in time. The patent in suit, however, did not contain any teaching in this respect in the same way.

III. This assessment does not withstand review on appeal in one crucial respect.

1. Contrary to the opinion of the patent court, the subject matter of claim 1 is not fully disclosed in NK5.

a) NK5 discloses a sandwich panel with a metal top layer for building cladding and a method of manufacturing the same.

An example of an embodiment of a panel that can be used in particular as a wall element is shown in Figure 1 reproduced below.



The sandwich panel (10) comprises two face layers (18, 20) and a planar core (12) of a rigid PIR foam having a cellular structure, which may have a density of 1.6 to 2.4 lbs/ft<sup>3</sup> in one embodiment and 1.9 to 2.1 lbs/ft<sup>3</sup> in a preferred embodiment (p. 5 lines 16-20). The foam layer (12) is directly bonded on its first

side (14) to the inner cover layer (18), which can consist of different materials such as metal, polymer materials or cellulose materials (p. 12 line 33 to p. 13 line 9). On its second side (16), the foam layer (12) is covered by an outer cover layer (20) made of metal (p. 11 lines 8-11). On the inner side (26) of the metal layer (20), a primer layer (22) is applied to improve adhesion with the foam layer (12) (p. 4 lines 10-16). This can, for example, consist of polyepoxy, polyurethane, polyacrylic or polyurea systems (p. 11 lines 25-29).

61               The sandwich panels of the NK5 are produced in a continuous process. The materials of the outer and inner face layers are provided as coils and fed onto the strip line (p. 15 lines 15-16). In one embodiment, the primer layer (22) is applied to the metal layer (20) shortly after it has been unrolled, smoothed and profiled and immediately before it is brought into close contact with the inner face layer (18) and the PIR foam compound is placed between them. If necessary, the process can be adjusted to allow the primer layer (22) on the metal layer (29) "to cure slightly before application of the polyisocyanurate foam mixture" (p. 12 lines 16-23). The metal may already have been provided with a primer by the manufacturer (p. 12 lines 27-29; p. 15 line 1).

62               In detail, NK5 describes the manufacturing process as follows: The metal layers would first be straightened and smoothed after unwinding. Both surface layers can be preheated, and metal layers can also be provided with a profile or embossing on the surface. If the metal layer is not already provided with a primer by the manufacturer, the primer layer (22) is applied to the inside (26) of the metal layer (20) after straightening, smoothing and, if necessary, preheating and profiling. In this embodiment, it may be necessary to postpone the next process step

depending on the curing rate of the polymer used for the primer layer (22). In addition, partial or complete curing of the primer layer in an oven or heating chamber can be achieved (p. 15 lines 15-30).

63                    In the further course of the process, a PIR reaction mixture is introduced between the cover layers (p. 15 line 36 to p. 16 line 3). In one embodiment, the cover layers are brought together for this purpose in such a way that the primer layer (22) on the inside (26) of the outer metal layer (20) and the inside of the inner cover layer (18) come into contact with the PIR reaction mixture simultaneously. In another embodiment, the PIR reaction mixture is first applied to only one of the two cover layers - in the case of the metal layer (20) to the primer layer (22) - and only then is the other cover layer brought into contact with it (p. 15 lines 3-14).

64                    b)        Thus, as the patent court rightly assumed and also the appeal does not doubt, discloses features 1, 2, 2.1, 2.2, 2.2.2, 2.3, 2.3.1, 2.3.2, 2.5 and features 3, 3.1, 3.4 and 3.6.

65                    c)        Also disclosed are features 2.2.3 and 2.3.2.

66                    aa)       The density of the polyisocyanurate is explicitly stated in NK5. The range of 30.4 to 33.6 g/l, which is described there as preferred, is within the range defined in characteristic 2.3.2.

67                    bb)       The density of the primer layer is not expressly stated. However, according to the findings of the Patent Court, which are not challenged in this respect, the designation of polyurethane results in a density in the range between 300 and 1250 g/l, which largely corresponds to the range of values mentioned in feature 2.2.3.

68                    d)        The Patent Court was also correct in considering feature 3.2 as disclosed.



69           According to the findings of the patent court, which are not challenged in this  
respect, the designation of known techniques such as roller coating, dip coating  
and electrocoating implies that the primer layer is applied in a liquid state and thus  
as a reaction mixture.

70           e)     NK5 further discloses the optional feature group 2.4 and the also  
optional feature 3.5.

71           f)     Contrary to the opinion of the patent court, feature 3.3 is not directly  
and unambiguously disclosed.

72           aa)    As the patent court did not fail to recognize in its approach, NK5  
does not contain any further details on the curing state of the primer layer at the  
time of application of the PIR reaction mixture.

73           bb)    From the already mentioned explanations in NK5, according to  
which terminal hydrogens in the polyurea layer enter into a chemical reaction with  
the reactive groups of the polyisocyanurate mixture forming the foam layer, no clear  
conclusions can be drawn in this respect.

74           Even if these explanations are applied to polyurethane, they do not  
indicate that the reaction described is only possible if the primer layer is not yet fully  
cured. The fact that NK5 also provides for the optional use of a metal layer with a  
primer layer applied by the manufacturer speaks against such an assumption.

75           Against this background, the statements that it may be necessary to wait  
a period of time before proceeding to the next process step, depending on the  
curing speed of the polymer used, and the reference to the fact that the primer layer

can additionally be cured completely or partially in an oven or heating chamber, tend to indicate that a primer layer applied in situ should also be substantially cured before the PIR reactive mixture is applied.

76                   cc)    Contrary to the opinion of the patent court, no further indications result from the statements according to which the primer layer is applied immediately before the inner cover layer (18) is brought up and the PIR foam mixture is introduced.

77                   It can be left open whether the wording "just before" in itself allows the conclusion that the primer layer is not yet fully cured at the time of application of the PIR foam compound. Taking into account the context in which the phrase is used, it does not allow a clear conclusion in this direction.

78                   The argumentation of the patent court is already contradicted by the fact that NK5 also refers in this context to the fact that curing of the primer layer should be made possible if necessary. Admittedly, this wording is not clear in itself either, because the word "slightly" can be referred to the verb "cure" as well as to the preposition "before" and the statements in NK5 do not clearly indicate which reference is meant. However, this creates additional doubt that NK5 is teaching an application of the PIR foam mixture to a not fully cured primer layer at this point.

79                   In addition, the more detailed description of the manufacturing process again refers to additional precautions to enable curing of the primer layer, and the word "slightly" is not used in this context. The reference added at this point that an oven can be used for partial or complete curing also permits the interpretation that the primer layer does not necessarily have to be completely cured when the PIR

foam mixture is introduced. However, the fact that this is mentioned as an additional measure indicates that partial curing in an oven can also have the function of shortening the waiting time until complete curing.

80                   dd)    Contrary to the applicant's view, no clear conclusions can be drawn from Example 1 described in NK5 regarding the curing state of the primer layer at the time of application of the PIR reaction mixture either.

81                   For the variant of a primer layer applied in situ, according to the example, the process is intended to allow a polyurea primer layer consisting of equal parts MDI and JEFFAMINE T-3000 amine to cure for ten seconds after being sprayed onto the inside of the steel layer before the PIR reaction mixture is applied (p. 16 lines 30-34). What degree of curing the primer layer has reached at the end of the ten seconds is not clear from the example. However, as in the general explanations of the process according to the invention, the fact that the use of a steel layer with a primer layer applied by the manufacturer is mentioned here as an equivalent alternative to the variant of a primer layer applied in situ (p. 16 lines 34-35) tends to indicate that the polyurea primer layer sprayed on in situ has essentially cured after the ten seconds have elapsed and thus when the PIR reaction mixture is applied.

82                   2.     The contested decision, does not prove to be correct in result for other reasons (Sec. 119 (1) Patent Act).

83                   a)     Contrary to the preliminary assessment of the Patent Court in the reference granted under Sec. 83 (1) Patent Act, the subject-matter of patent claim 1 was not obvious on the basis of NK5.

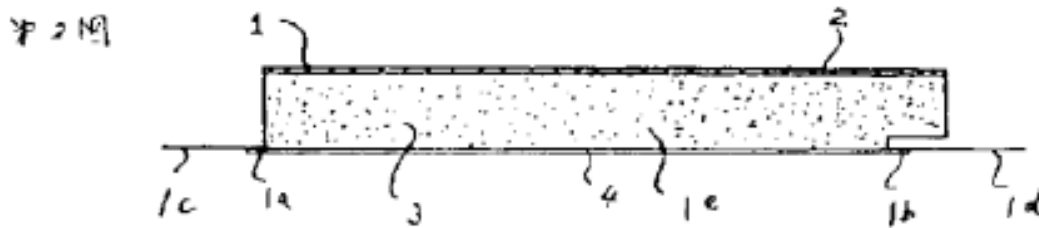
84                In this context, it can be assumed with the patent court that it was part of  
the general technical knowledge that the formation of chemical bonds assumed  
in NK5 as the cause of the good adhesion effect can succeed all the better, the  
more potential reaction partners are available.

85                In order to arrive at the subject-matter of the patent in suit, it was also  
necessary under this premise to additionally recognize that suitable reaction  
partners are available to a greater extent in an adhesion promoter layer of  
polyurethane applied as a liquid reaction mixture as long as the curing process  
has not yet been completed. In this respect, NK5 did not provide a sufficient  
suggestion, because application as a liquid is mentioned only in passing as one  
of several possible methods, the alternative methods described in more detail  
even include the use of metal layers with a primer layer applied by the  
manufacturer, and NK5 does not highlight any of these methods as particularly  
suitable.

86                b)        The subject matter of the patent in suit is neither disclosed nor  
suggested by Japanese patent application Sho 53-16783 (NK9; German  
translation: NK9A).

87                aa)       NK9 addresses the task of improving the adhesion of composite  
panels with a core of polyurethane or polyisocyanurate to prevent the layers from  
peeling off over time due to external influences (NK9A p. 2 line 21 to p. 3 line 22).

88                As a solution, NK9 proposes to insert an adhesive layer between the top  
layer and the foam core. An example of such a composite panel is shown in Figure  
2 below.



89                    Adhesive in the form of a thin layer (2, 20) is applied to a rigid substrate (1, 10), which may, for example, consist of metal (NK9A p. 3 line 27 to p. 4 line 1) (NK9A p. 4 line 10-11; p. 5 line 24).

90                    Suitable adhesives are substances that enable the face layer and the core material of the composite panel to be firmly bonded together by a chemical bond (NK9A p. 4 lines 12-16; p. 5 lines 25-28). Among others, thermosetting, thermoplastic or also mixed adhesives are described as suitable (NK9A p. 4 Z. 17-20). Adhesives containing an isocyanate or diisocyanate that is chemically reactive with components of the foam core material are highlighted as advantageous, because they can produce a particularly strong bond that is stronger than if the foam core material were applied directly to the top layer (NK9A p. 5 line 23 to p. 6 line 3).

91                    During or after the formation of the adhesive layer, a foam (3), for example a PUR foam or a PIR foam, which may contain flame retardants (NK9A p. 4 line 23 to p. 5 line 1), is applied in liquid or granular form to the adhesive layer by means of an applicator (16) (NK9A p. 6 line 3-5). Finally, the second cover layer (Figure 2: 4; Figure 4: 18) is applied, which may consist of a sheet-like material such as kraft paper, synthetic resin foil or aluminum foil (NK9A p. 5 lines 1-4).

92                    NK9 adds that the process according to the invention does not generally form a structure in which the adhesive layer and the foam layer are so clearly

separated from each other as shown in the schematic diagram in Figure 2. Rather, an entangled structure is formed in which the adhesive layer and the foam layer penetrate each other, or a structure in which the two layers are difficult to distinguish from each other due to a homogeneous substance forming (NK9A p. 6 lines 12-19).

93                    In a first embodiment, polyurethane foam raw material is used as the core material and MDI (methylene diphenyl isocyanate) as the adhesive, and in a second example, PIR foam raw material and epoxy-amine adhesive are used (p. 6 line 25 to p. 7 line 6).

94                    bb) This resulted in no suggestion to combine a core of polyisocyanurate with a reaction mixture for polyurethane.

95                    (1) NK9 does list isocyanates as particularly suitable adhesives. However, isocyanates are only one of at least two components needed for a reaction mixture to produce polyurethane. Such a reaction mixture is mentioned in NK9 only in connection with the core material, but not as an adhesive in question.

96                    (2) A suggestion to nevertheless use such a mixture as an adhesive did not result from a supplementary reference to NK5 either.

97                    In NK5, a primer layer of this material is indeed used. However, as already explained above, NK5 does not show that the primer layer is brought into contact with the PIR foam mixture applied to it before it is completely cured. In order to arrive at a combination of NK5 and NK9, it would therefore have been necessary to recognize that the primer layer in NK5 acts in the same way as the adhesive in NK9.

98                    The fact that both statements explain the mode of action with chemical bonds between the two layers may have been in favor of such considerations. However, this also does not show that it is important to apply the PIR foam mixture

before the primer layer has cured. NK9 does not emphasize this procedure as particularly suitable, but juxtaposes application during or after formation of the adhesive layer as basically equivalent.

99                   c)     The subject matter of the patent in suit is also not disclosed or suggested by European patent applications 728 574 (NK8) and 1 279 885 (NK10).

100                  aa)    NK8 discloses a process for the production of self-supporting sandwich structural elements comprising at least one solid polyurethane layer and at least one polyurethane foam layer.

101                  (1)    The citation deals with the task of improving the adhesion of such sandwich structural elements to moldings made of polymethyl methacrylate (PMMA) and avoiding distortions that can occur during curing of the polyurethane reactive mixture as a result of shrinkage occurring at different times in the layers of the structural element (Sp. 1 lines 34-36; Sp. 2 lines 9-15).

102                  As a solution, NK8 proposes to use a polyurethane reactive compound with a certain amount of mica at least for the solid polyurethane layers (Sp. 2 lines 15-20).

103                  The sandwich structures according to the invention are produced by layer-by-layer application to a substrate (Sp. 3 lines 45-47). In an advantageous embodiment, the individual solid and foam layers are produced by spraying on the reactive mixture in several layers in order to avoid, in particular when a thicker layer is to be produced, a run-off of the respective still liquid, non-reacted layer from an inclined application surface. The application of the successive layers of a layer, as well as the application of the first layer of a foam layer to the last layer of the solid polyurethane layer underneath, should preferably be carried out "wet in

wet", which, according to the explanations in NK8, is to be understood as meaning that the preceding layer has not yet fully reacted when the subsequent layer is applied and the tack-free state has not yet been reached (Sp. 4 lines 7-21).

104           (2)    This resulted in no suggestion to apply a layer consisting of polyisocyanurate to a polyurethane reaction mixture as long as it is not yet fully cured.

105           It is true that the skilled person can learn from NK8 - as the appellant rightly asserts in this respect - that it is advantageous to apply a layer before the preceding layer has fully cured, because the latter is then still in an adhesive state and better adhesion can thus be achieved. However, this, as well as the explanations in NK9, did not give rise to any suggestion to transfer this finding to the joining of a primer layer of polyurethane and a PIR foam compound.

106           bb)   NK10 discloses a method for thermally insulating metallic structures exposed to extremely low temperatures, for example, fuel storage tanks of aerospace equipment.

107           (1)    NK10 criticizes the procedures used so far for being cumbersome and cost-intensive (para. 14).

108           In order to be able to insulate metal structures in series at a reasonable cost and with the required quality (par. 16), NK10 proposes that the polyurethane foam serving as an isolating agent not be applied directly to the metal, but that the surface of the metal first be provided with an adhesive layer, wherein in a preferred embodiment polyurethane formed from an isocyanate and a polyol is provided as the adhesive agent (par. 22, 34).



The polyurethane foam should then be applied to the metal surface prepared in this way, at a time when the adhesive has not yet polymerized and cured (par. 19, 37).

109           (2)    This did not result in a suggestion to apply a polyisocyanurate-containing foam layer to a not yet polymerized polyurethane-containing adhesion promoter layer.

110           The skilled person can see from NK10 as well as from NK8 that better adhesion can be achieved if the foam is applied to the adhesion promoter layer as long as this has not yet polymerized and cured. However, NK10 also refers exclusively to structures with a foam layer made of polyurethane. NK10 also states that it is preferable if the adhesive and foam layers are compatible in terms of their chemical nature and each consists of polyurethane formed from a polyol and an isocyanate, because then the adhesive and foam layers polymerize simultaneously (par. 22).

111           From all this, there was no suggestion to transfer the findings disclosed in NK10 to the combination of a primer layer of polyurethane and a PIR foam compound. In this combination, the basic conditions described as favorable in NK10 - the presence of a polyol and an isocyanate in both layers - may indeed also be fulfilled. However, NK10 teaches that both layers should preferably be made of the same material for this purpose, and thus does not give any reason to address the question of whether the conditions mentioned can also be met when different materials are used.

112           d)    The further citations are, as the Patent Court has already stated in its reference under Sec. 83 (1) Patent Act, more remote and therefore do not require a more detailed discussion.

113                   IV.     The case is ripe for final decision (Sec. 119 (5), second sentence,  
Patent Law).

114                   For the reasons set out above, the patent in suit proves to be legally valid.  
The action must therefore be dismissed.

115                   V.     The decision on costs is based on Sec. 121 (2) Patent Law in  
connection with Section 91 (1) of the Code of Civil Procedure.

Bacher

Hoffmann

Deichfuß

Kober-Dehm

Crummenerl

Lower court:

Federal Patent Court, decision of 28.01.2020 - 3 Ni 3/19 (EP) -