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Datasheet for the decision of 3 March 2021

Case Number: T 0098/17 - 3.2.01

Application Number: 08849349.9

Publication Number: 2209696

IPC: B62D25/04, B62D29/00

Language of the proceedings: EN

Title of invention:
A B-PILLAR FOR A VEHICLE

Patent Proprietor:
Gestamp HardTech AB

Opponents:
voestalpine Metal Forming GmbH
Bayerische Motoren Werke Aktiengesellschaft
Benteler Automobiltechnik GmbH

Headword:

Relevant legal provisions:
EPC Art. 54, 56

Keyword:
Novelty (yes)
Inventive step (no)

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Catchword:

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Boards of Appeal

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Case Number: T 0098/17 - 3.2.01

D E C I S I O N
of Technical Board of Appeal 3.2.01
of 3 March 2021

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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted on 9 December 2016 rejecting the opposition filed against European patent No. 2209696 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman G. Pricolo
Members: C. Narcisi
A. Jimenez

Summary of Facts and Submissions

I. The opposition was rejected and the European patent No. 2 209 696 was maintained as granted by the decision of the Opposition Division posted on 9 December 2016. Against this decision an appeal was lodged by Opponents 1, 2 and 3 (hereinafter designated as the Opponents) in due form and in due time pursuant to Article 108 EPC.

II. Oral proceedings were held on 3 March 2021. The Appellants (Opponents) requested that the impugned decision be set aside and that the patent be revoked. The Respondent (Patentee) requested that the appeals be dismissed and that the patent be maintained as granted (main request), or in the alternative, that the patent be maintained in amended form on the basis of auxiliary requests 2 to 6 filed on 1 August 2017 with the reply to the statement of grounds of appeal.

III. Claim 1 of the main request reads as follows:

"A B-pillar for a vehicle, comprising an upper fastening portion (12) for fastening to a roof member (13), and a lower fastening portion (14) for fastening to a sill member (15), the main portion of the B-pillar being of predominantly martensitic structure with a tensile strength of at least 1300 MPa and a less strong lower portion (20) of the pillar having a tensile strength of not more than 800 MPa, characterised in that the less strong portion (20) has a height of more than 30 mm, extends less than 1/3 of total height of the pillar, and is so positioned that the lower fastening portion (14) is predominantly martensitic."

Claim 1 of auxiliary request 2 differs from claim 1 of the main request in that the characterising portion is replaced by "characterised in that the less strong portion (20) has a height of more than 30 mm and less than 200 mm, is situated in the lowest third of the pillar, extends less than 1/3 of total height of the pillar, and is so positioned that the lower fastening portion (14) is predominantly martensitic".

Claim 1 of auxiliary request 3 differs from claim 1 of the main request in that the wording "has a height of more than 30 mm" is replaced by "has a height of between 50 and 200 mm".

Claim 1 of auxiliary request 4 differs from claim 1 of the main request in that the wording "has a height of more than 30 mm, extends less than 1/3 of total height of the pillar" is replaced by "has a height of between 50 and 200 mm, extends less than 1/4 of the total height of the pillar".

Claim 1 of auxiliary request 5 differs from claim 1 of auxiliary request 4 in that the wording "a tensile strength of at least 1300 MPa" is replaced by "a tensile strength of at least 1400 MPa".

Claim 1 of auxiliary request 6 differs from claim 1 of auxiliary request 5 in that the wording "a height of between 50 and 200 mm" is replaced by "a height of between 50 and 200 mm, is situated in the lowest third of the pillar".

IV. The Appellants' arguments may be summarized as follows:

The subject-matter of claim 1 of the main request is not new over D18 (WO-A1-2006/038868) since this document discloses a B-pillar for a vehicle which incorporates a hat beam according e.g. to figure 1 (and the corresponding portions of the description) of D18, thus fulfilling according to D18 (see pages 2, 3) all the features required by claim 1, in particular having a tensile strength of at least 1300 MPa and a less strong portion (20) (see figure 1) with a height of more than 30 mm, extending less than 1/3 of total height of the pillar.

The subject-matter of claim 1 (main request) lacks an inventive step in view of D2 (US-B2-6 820 924) and D18. This subject-matter distinguishes from the B-pillar disclosed by D2 in that features M1.4 (i.e. "the main portion of the B-pillar being of predominantly martensitic structure with a tensile strength of at least 1300 MPa") and M1.5 (i.e. "and a less strong lower portion (20) of the pillar having a tensile strength of not more than 800 MPa") are not derivable from D2.
By contrast, features M1.6 (i.e. "the less strong portion (20) has a height of more than 30 mm"), M1.7 (i.e. "extends less than 1/3 of total height of the pillar") are implicitly disclosed in figure 7 of D2 or at least suggested to the skilled person in view of D2, the skilled person being certainly capable of at least approximatively deducing proportions between related constructional parts in a drawing, likewise knowing the average length of a vehicle's B-pillar being undisputedly ca. 120 centimeters. Finally, feature 1.8 (i.e. "and is so positioned that the lower fastening portion (14) is predominantly martensitic") is at least partly known from D2, showing in figure 7 that the lower fastening portion is not heat treated to decrease

the tensile strength (thus retaining its initial, higher tensile strength), the weakened crush zones 44 being only formed further upwards.
In view of the aforementioned differences, the skilled person starting from D2 would face the objective problem of determining the appropriate material and its tensile strength values (lower and higher strength zones), including specific widths of said zones. The solution is provided in an obvious manner by D18, disclosing steel material of corresponding tensile strength, being treated to obtain said higher and lower tensile strength zones, as well as disclosing corresponding widths of said zones.

The subject-matter of claim 1 of auxiliary request 2 to 6 does not involve an inventive step, for the added features are obviously derivable from D2 in conjunction with D18, likewise taking into account routine trial and error and optimisation methods commonly used by the skilled person.

V. The Respondent’s arguments may be summarized as follows:

The subject-matter of claim 1 is new over D18. Indeed, D18 does not clearly and unambiguously disclose a vehicle’s B-pillar having anyone of the features included in claim 1.

The subject-matter of claim 1 is inventive over D2 in view of D18.
Firstly, D2 clearly and undoubtedly does not disclose or suggest features M1.4, M1.5. M1.6, M1.7 and M1.8. Indeed D2 gives no indications or specifications concerning material tensile strength, both in relation to the higher strength and lower strength portions, as

well as relating to the tensile strength of the upper and lower fastening portions of the B-pillar. Further, D2 gives no clear indications or suggestions relating to specific dimensions and position of said zones, D2 even stating that the position of the soft zone ("crush trigger") is determined as a function of the material characteristics, wall thickness and dimensions of a rectangular tube (D2, column 2, lines 28-38).

Secondly, the skilled person would not combine in an obvious manner D2 and D18 since this would only be the result of hindsight and arbitrarily choosing and selecting features ("i.e. "cherry-picking") from a document.
D18 (similarly to D2) does not mention or provide a solution to the invention's objective problem (see paragraph [0008] of the patent specification (hereinafter designated as EP-B)) of promoting a specific deformation behaviour of the B-pillar (see figure 4 of EP-B) in order to protect the passenger's hip area.
Moreover D18 does not disclose that the soft zone has a tensile strength of not more than 800 MPa (feature M1.5), a soft zone strength 20% to 80% lower than the higher tensile strength zone of 1500 MPa (see D18, page 3, first paragraph) not necessarily implying that the entire soft zone's strength disclosed in D18 is below 800 MPa.
Similarly, no unequivocal disclosure is to be found in D18 of a soft zone having a width not lower than 30 mm (feature M1.6), given D18 specifying only a distance between higher tensile strength zones (ca. 40 to 50 mm), this distance inherently implying the soft zone width being reduced by 10 to 20 mm due to unavoidable heat loss or transfer (from the soft zone) to the contiguous high strength zone (during the hardening

process' inherent rapid cooling). This leads to a soft zone width of less than 30 mm.
D18 likewise, analogously to D2, does not give any hint as to the material tensile strength of the upper and lower fastening portions of the B-pillar, the skilled person merely being able to derive an explicit indication from document D3 (EP-A1-1 180 470) which, as opposed to D18 and contrary to feature 1.8, discloses that the lower fastening portion is formed by lower tensile strength steel.

The combination of all and every single of the claimed features allows to obtain the deformation behaviour of the B-pillar as illustrated in figure 4 of EP-B, this combination of features not being obvious for the skilled person, for the skilled person would not combine D2 and D18 in an obvious manner, and even based on the assumption that it would combine these documents, the skilled person would nonetheless not arrive at the subject-matter of claim 1.

The subject-matter of claim 1 of auxiliary requests 2 to 6 also involves an inventive step for the aforementioned reasons and in view of the further added features. In particular, the features implying the soft zone having "a height of between 30 and 200 mm", or "a height of between 50 and 200 mm", and/or "is situated in the lowest third of the pillar", and/or "extends less than 1/4 of the total height of the pillar" and/or "the main portion of the B-pillar being of predominantly martensitic structure with a tensile strength of at least 1400 MPa" all further and additionally contribute to inventive step involved in the subject-matter of claim 1 of the main request.

Reasons for the Decision

1. The appeals are admissible.

2. The subject-matter of claim 1 of the main request is new (Article 54 EPC) over D18 since the technical objects illustrated in figures 1 to 5 of D18 (and as described in the related parts of the description in D18) are clearly stated to represent a "hat beam" (see D18, page 1, last paragraph) and not a B-pillar, which is only mentioned on page 4 (see last paragraph: "the invention can be applied to for example to pillars of automotive vehicles, e.g. B-pillars). D18 simply includes no further disclosure as to the specific way in which said hat beam is incorporated into a vehicle's B-pillar and the specific (e.g. structural or configurational) modifications needed therefor. Consequently, D18 cannot anticipate the claimed subject-matter.

3. The subject-matter of claim 1 (main request) does not involve an inventive step (Article 56 EPC) over D2 in view of D18.

The skilled person starting from D2, which undisputedly discloses (see Fig. 7) a B-pillar for a vehicle, comprising an upper fastening portion for fastening to a roof member, and a lower fastening portion for fastening to a sill member (i.e. features M1.1 to M1.3 of claim 1 according to the numbering of features in accordance with the contested decision), would clearly and unambiguously derive feature M1.7 (i.e. "extends less than 1/3 of total height of the pillar") from this document. Indeed, figure 7 in conjunction with column 5 (lines 23-37) shows that a crush trigger 44 (soft zone)

is provided in the lower portion of the B-pillar (upper crush trigger 48 being merely optional), this soft zone having a width representing a very minor portion of the B-pillar's overall length, evidently far less than 1/3 thereof. Insofar as no exact measurements taken from the drawings are involved (since patent drawings are usually not drawn to scale), this technical teaching is undoubtedly derivable from D2, given approximate relative positions and approximate relative dimensions (or proportions) forming an essential part of the technical teaching inferred from any drawing illustrating a technical object or device. Additionally, the importance of the position and dimensions of the soft zone in order "to absorb impact energy in a controlled fashion" is evidently emphasized in D2, stating that "it is believed that the body pillar assembly 42 with crush triggers 44, 48 is more likely to bend at the top and bottom instead of the middle and thereby improve occupant protection" (D2, column 5, lines 23-37). From figure 7 the skilled person moreover very clearly infers that the crush trigger 44 is located in the lowest third of the B-pillar and certainly has a width less than 1/3, and even less than 1/4, of its overall length.

Concerning feature M1.6 (i.e. "the less strong portion (20) has a height of more than 30 mm") the skilled person would at least derive from figure 7 of D2 that said crush zone 44 has a width of approximately some centimeters, given e.g. the usual and common B-pillar's length of ca. 80 to 120 cm (as noted by the Opponents in their statement of grounds of appeal (see e.g. Opponent 3, statement of grounds of appeal, page 4 last paragraph); see also appealed decision, page 6). Similar conclusions may be drawn by comparing the soft zone's width to the B-pillar's transversal width as

depicted in figure 7 of D2. Consequently, whilst feature M1.6 is not clearly and unambiguously derivable from D2, the skilled person would derive from D2 an incentive to look for parameter values of said soft zone's width situated in a range including 30 mm (and comprising both greater and smaller values). Feature M1.6 is therefore manifestly suggested to the skilled person by the disclosure of document D2.

Concerning feature M1.8 (i.e. "and is so positioned that the lower fastening portion (14) is predominantly martensitic") the skilled person would derive from D2 that the lower fastening portion (like the upper fastening portion) is not heat treated to reduce the tensile strength and increase ductility, as this is performed exclusively in localized regions of the B-pillar were said crush zones or soft zones are implemented (see e.g. figure 7, column 5, lines 23-37; column 1, lines 54-58; column 2, lines 54-56; in D2, as opposed to D18, a manufactured item or product formed from a high tensile strength alloy is considered and soft zones are formed by applying localized heat treating with slow cooling). Therefore, whilst feature M1.8 is not clearly and unambiguously derivable from D2, the skilled person would derive from D2 that the lower fastening portion is formed of a high tensile strength material, thereby obviously suggesting feature M1.8.

Features M1.4 (i.e. "the main portion of the B-pillar being of predominantly martensitic structure with a tensile strength of at least 1300 MPa") and M1.5 (i.e. "and a less strong lower portion (20) of the pillar having a tensile strength of not more than 800 MPa") are undisputedly not known from D2.

In view of the above differences (i.e. based on features M1.4, M1.5, M1.6, M1.8) the skilled person starting from D2 would face the technical problem of implementing and further improving the teaching of D2, i.e. such as to absorb impact energy in a controlled fashion and thereby improve occupant protection (see also D2, column 5, lines 32-37). Evidently this also includes protection of the occupant's hip (as observed by the Opponents during oral proceedings), since this is one of the most fragile parts of the human body and since the sitting occupant's hip is located in the collision region (approximately at the same height of a car's bumper; see e.g. D2, figure 7) in case of a lateral impact in the centre or centre-rear portion of the car.

Therefore the skilled person would look for a material having an appropriate tensile strength and would try to determine or select appropriate dimensions (width) of the soft zone.
This information is obviously provided by D18, disclosing a method which can be applied to "B-pillars, for trigging the buckling to start in a desired part of the pillar, usually the lower part" (D18, page 4, second paragraph).

D18 describes a "method of hot stamping a sheet metal blank to a product in a cooled pair of tools and hardening of the formed product in the pair of tools using them as a fixture, wherein both tools of the pair of tools have an area with a clearance to the formed product so that a soft zone is formed in the product" (D18, page 1, paragraph 1), wherein hardenable steel is used as sheet metal and "hardened to an ultra-high strength for example to a tensile strength of 1500 MPa or even higher" (D18, page 2, paragraph 1), the

hardened “martensitic” structure being obtained by rapid and fast cooling after heating to “austenitizing” temperature (D18, page 2, first paragraph). Hence feature M1.4 is disclosed in D18. As regards feature M1.8, D2 already suggests implementing a lower fastening portion having a high tensile strength (see above). Additionally, D18 (contrary to the Patentee’s view) also suggests forming the lower fastening portion of the B-pillar from high tensile strength steel, as the skilled person would infer from the hat beam structure of figure 1 to 5 that all lower and upper portions illustrated have a high tensile strength, thus hinting at a possible similar configuration to be adopted in a B-pillar. Hence the skilled person would obviously use a predominantly martensitic structure in the lower fastening portion of the B-pillar of D2.

The tensile strength of the soft zone is “20-80% lower than in the fully hardened material” (D18, page 3, lines 1-2), i.e. the tensile strength is situated in the value range between 300 and 1200 MPa, this range having a very large overlap with the range of feature M1.5. Consequently, feature M1.5 is known from D18, the value of e.g. 300 MPa (corresponding to 80% lower strength) moreover constituting clearly for the skilled person a starting point for an optimisation or trial and error method. It is also noted that (contrary to the Patentee’s view) there would be no valid reason for the skilled person to construe the feature “20-80% lower than in the fully hardened material” as meaning that the tensile strength is not constant throughout the soft zone and may oscillate between said values (or between any values), given that obviously the method of D18 is intended to provide a fast respectively slow cooling process, which is homogeneous in the high tensile strength respectively low tensile strength

(soft) zone. Possible inhomogeneous zones are indeed already taken into account in D18 by considering said transition zones (i.e. 10 to 20mm) between high tensile strength zones and soft zones (see discussion hereinbelow).

As to feature M1.6, D18 teaches that in order to get a soft zone (areas with clearance to the tools) the distance between high tensile strength zones (areas with full contact with the tools) should be at least 40-50 mm, because of heat transfer from the area with clearance to the tools into the area with full contact with the tools (D18, page 3, second paragraph) and because of consequent noticeable hardening 10-20 mm into the soft zones (D18, page 3, second paragraph). Therefore D18 discloses a soft zone width of at least 30 mm (taking into account a 10 mm "noticeable hardening" transition zone on each side of the soft zone), considering that D18 requires the distance between hardened zones to be at least 40-50mm and that for B-pillars a "comparatively large zone may be desired" (D18, page 4, second paragraph). Hence feature M1.6 is disclosed in D18, thus also confirming the approximated width of the soft zone as suggested to the skilled person already in D2 (see above).

In view of the above it is concluded that the skilled person starting from D2 would arrive in an obvious manner at the subject-matter of claim 1 in view of D18.

4. The subject-matter of claim 1 of auxiliary requests 2 to 6 does not involve an inventive step (Article 56 EPC).

The subject-matter of claim 1 of auxiliary requests 2 to 6 is rendered obvious for the skilled person in view of D2 and D18, since the further features added by way of amendment and implying the soft zone having (a) "a height of between 30 and 200 mm", or having (b) "a height of between 50 and 200 mm", and/or that it (c) "is situated in the lowest third of the pillar", and/or that it (d) "extends less than 1/4 of the total height of the pillar" and/or implying (e) "the main portion of the B-pillar being of predominantly martensitic structure with a tensile strength of at least 1400 MPa" do not further contribute to inventive step.

In effect, features (a) and (b) are already suggested by D2 and D18, given that D18 discloses a soft zone width situated around 30 mm and actually larger than 30 mm (see above discussion) and given that the skilled person would recognize an upper bound for said width being necessary, an exceedingly large soft zone resulting in a B-pillar not having sufficient rigidity to protect the vehicle occupant. Thus, the skilled person would easily determine an upper bound and a lower bound for said soft zone width by a routine trial and error procedure or optimisation procedure, a lower bound being determined by determining a width implying a minimum required and desired controlled deformation behaviour and energy absorption (without breaking or buckling in a single location and becoming less susceptible to fracture; see D2 , column 1, lines 22-28, lines 46-53) ensuring an improved occupant protection.

As already noted above, features (c) and (d) are clearly derivable from D2, feature (e) being known from D18 (page 2, first paragraph).

The actual result of the optimisation process including the soft zone width, as well as the soft zone's and hardened zone's tensile strength, will of course depend on the specific dimensions (e.g. length) of the B-pillar. Such an optimisation (or routine trial and error procedure) is part of the customary practice of the skilled person, given that D2 and D18 already provide in combination abundant and ample indications concerning possible value ranges for the soft zone width (and its location) and the soft and hardened zone tensile strength. In addition, the value ranges indicated in claim 1 concerning soft zone width (30 to 200 mm, or 50 to 200 mm) and soft zone tensile strength (less than 800 MPa) are very broad (e.g. making up more than 1/10 of a B-pillar having 1200 mm length) and the skilled person would obviously consider or contemplate selecting from any reasonably broad (see above discussion on upper and lower bounds) width's parameter value range (and tensile strength parameter value range), which is visibly and directly related to the location of the collision zone on the B-pillar and to its spatial extent, both of which are derivable from and observable in actual crash tests and computer simulation crash tests.

Order

For these reasons it is decided that:

The appealed decision is set aside.

The patent is revoked.

The Registrar: The Chairman:

D. Magliano G. Pricolo

Decision electronically authenticated