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# D E C I S I O N
## of 28 January 1999

**Case Number:** T 0312/97 - 3.2.1

**Application Number:** 90830575.8

**Publication Number:** 0440001

**IPC:** B62D 65/00, B23K 26/00

**Language of the proceedings:** EN

**Title of invention:**
A device for laser welding motor vehicle bodies

**Patentee:**
Comau S.p.A.

**Opponent:**
Bayerische Motoren Werke Aktiengesellschaft
KUKA Schweissanlagen + Roboter GmbH

**Headword:**
-

**Relevant legal provisions:**
EPC Art. 56

**Keyword:**
"Inventive step (yes)"

**Decisions cited:**
-

**Catchword:**
-

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**Case Number:** T 0312/97 - 3.2.1

# D E C I S I O N
## of the Technical Board of Appeal 3.2.1
## of 28 January 1999

**Appellant:** (Opponent 01)
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**Respondent:** (Proprietor of the patent)
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**Decision under appeal:** **Interlocutory decision of the Opposition Division of the European Patent Office posted 11 March 1997 concerning maintenance of European patent No. 0 440 001 in amended form.**

**Composition of the Board:**

**Chairman:** F. Gumbel
**Members:** S. Crane
J.-C. Saisset

## Summary of Facts and Submissions

I. European patent No. 0 440 001 was granted on 26 January 1994 on the basis of European patent application No. 90 830 575.8.

II. The granted patent was opposed by the present appellants (opponents 01 and 02) on the basis that its subject-matter lacked novelty and/or inventive step (Article 100(a) EPC).

Of the prior art documents relied upon by the appellants in the course of the opposition proceedings only the following have played any significant role on appeal:

(D1) EP-A-0 136 190

(D2) DE-U-8 812 396

(D4) A leaflet of the company Lumonics Ltd. entitled "Triple Laser Power for High Speed Cutting and Welding".

III. With its decision posted on 11 March 1997 the Opposition Division held that the patent could be maintained in amended form.

IV. An appeal against that decision was filed on 15 March 1997 by opponents 01 and on 4 April 1997 by opponents 02. In both cases the appeal fee was paid at the same time as the respective appeals were filed. The statements of grounds of appeal were filed on 10 July 1997 and 14 July 1997 respectively.

In the statements of grounds of appeal two further prior art documents were referred to, namely (D12) "Laser Welding in Automatic Assembly Line for Color-CRT Electron Gun", Shimoi et al, Annals of the CIRP volume 32/1/1983, pages 135 to 139 (by opponents 01) and (D13) "Portrait einer Branche - eine Sonderpublikation der Zeitschrift LASER", Publikationsgesellschaft moderne Industrie AG & Co. KG, 1989 (by opponent 02).

V. Oral proceedings before the Board were held on 28 January 1999.

At the oral proceedings the respondents (proprietors of the patent) submitted a new set of claims 1 to 5, revised description and an amended Figure 3 of the drawings on the basis of which, together with Figures 1, 2, 4 and 5 as granted, they requested maintenance of the patent in amended form.

Independent claims 1 and 5 read as follows:

"1. A device for welding loosely pre-assembled motor-vehicle bodies (B), comprising:

- at least one flexible welding station (1) for welding the bodies (B), adapted to operate on at least two different types of motor-vehicle bodies,

- a conveyor line (2) for transporting the loosely pre-assembled bodies (B) to said at least one welding station (1),

- locating means (G1, G2, 4) provided at said at least one welding station for clamping the component parts of the body (B) in the correct position for welding, said locating means including at least two pairs of locating frames

(G1, G2) arranged at the two sides of said at least one welding station and rapidly interchangeable in a working position in dependence on the type of body to be welded, each pair of locating frames having locating devices (4) suitable for a respective body type, and

- welding means (5) provided at the station for welding the component parts of the body (B) which is at the welding station together, after they have been clamped by the locating devices (4) of the pair of locating frames which are in said working position,

characterized in that the welding means comprise:

- a plurality of laser welding torches (5) which are respectively associated with an equivalent number of locating devices (4) carried by said pairs of locating frames (G1, G2),
- laser emission means (S), and
- bundles of optical fibres for connecting various laser welding torches of each working locating frame (G1, G2) to said laser emission means (S) when the locating frame is brought to its working position,
- each locating frame (G) carrying an optical distributor device (8) having an input for optical connection to a laser source (S) of the laser emission means and a plurality of outputs connected optically to the laser-welding torches (5) carried by the locating frame,

- the welding station having quick-coupling means (10) for the optical connection of the input of the optical distributor device (8) carried by a particular locating frame (G) to the respective laser source (S) when the locating frame is brought to its working position, wherein the quick-coupling means comprise a cylindrical body (17) aligned with the output of the laser source (S) and movable relative to the locating frame (G) by a motor (15') between a disconnected position and a coupling position."

"5. A device for welding loosely pre-assembled motor-vehicle bodies (B), comprising:

- several stations (30A, 30) for welding the bodies (A, B),

- a conveyor line (2) for transporting the loosely pre-assembled bodies (A, B) to the welding stations (30A, 30B), said stations been arranged in line along the conveyor line (2),

- locating means provided at said welding stations for clamping the component parts of the bodies in the correct position for welding

- in which the locating means include locating devices (4) which are carried by two locating frames (G) arranged at the two sides of the welding stations,

- wherein the several welding stations are provided for operating on respective types of motor-vehicle bodies, each welding station having a pair of locating frames with locating devices suitable for a respective body type,

- welding means (5) provided at the stations for welding the component parts of the bodies (A, B) together after they have been clamped by the locating means,

characterised in that

- the welding means comprise a plurality of laser welding torches (5) which are associated with the locating means and are connected to laser emission means (35) by bundles of optical fibres (6),

- wherein the laser-welding torches (S) are carried by the locating frames (G), and

- the laser emission means being connected by optical fibres (6) to the laser welding torches (S) of all the welding stations,

and wherein the laser emission means comprise a plurality of emitters (36) each provided at its output with an optical distributor device (37) whose outputs are connected by optical fibres (6) to the laser-welding torches (5) of all the welding stations."

Dependent claims 2 to 4 relate to preferred embodiments of the device according to claim 1.

The appellants requested that the decision under appeal be set aside and the patent revoked in its entirety.

VI. The arguments put forward by the appellants in support of their request can be summarised as follows:

A device having all the features of the preamble of claim 1 was disclosed in document D2. Here each locating frame carried a plurality of electrical spot welding guns which were automatically connected to a

common electrical power supply when the locating frame was in its working position. Having regard to the fact that it was known from document D1 to weld pre-assembled vehicle bodies by means of a laser and to the advances in laser welding technology as portrayed in documents D4, D12 and D13, from which in particular the advantages of connecting welding torches to the laser source by means of an optical distributor device and optical fibres were apparent, it was an obvious step for the person skilled in the art to replace the spot welding guns of document D2 by such known laser welding torches. For the device to be workable, given the requirement for movement of the locating frames, there could not however be a permanent connection between the laser source and the welding torches and some form of quickly connectible and disconnectible coupling would obviously be required, similar in principle to those used for both the electrical and hydraulic power supply to the locating frame of the prior art according to document D2. The details of the optical coupling means contained in present claim 1 did not go beyond routine design considerations.

Having regard to the amendments made to independent claim 5 there were no longer any substantive objections to this. For the sake of clarity it should however be made clear that each welding station was dedicated to a particular vehicle body type.

VII. In reply the respondents argued substantially as follows:

Starting from the basic premise that it was an obvious step for the person skilled in the art to replace the electrical spot molding guns of the device of document D2 by laser welding means the appellants had then effectively used the present patent specification as a blueprint for how in practice this was to be

achieved in an optimal manner. This was a typical case of inadmissible ex-post-facto analysis. The fact of the matter was that the appellants had been unable to show anything even remotely equivalent in the state of the art to the means claimed by which the laser welding torches were connected to the laser source.

It was already clear from the wording of claim 5 that each welding station was associated with a particular vehicle body type, so no further amendment was necessary in this respect.

## Reasons for the Decision

1. The appeals comply with the requirements of Articles 106 to 108 and Rules 1(1) and 64 EPC. They are therefore admissible.

2. *Considerations under Articles 123(2) and (3) EPC*

Present independent claim 1 combines all the features of granted claims 1 to 4 with features taken from granted claims 5 and 7 relating to the construction and operation of the quick-coupling means between the optical distributor device and the laser source. The remaining features of granted claims 5 and 7 form the subject of present dependent claims 2 and 4. Present dependent claim 3 corresponds to granted claim 6. Present independent claim 5 combines all the features of granted claims 1, 8 and 9. The granted claims correspond to those originally filed.

The amendments to the description and drawings do not go beyond those necessary to bring this into conformity with the claims and to remove clerical errors.

Thus there are no objections under Articles 123(2) and (3) EPC against the documents according to the request of the respondents.

3. *Claim 1*

Claim 1 is directed to a device for welding loosely pre-assembled motor vehicle bodies wherein the welding station has the flexibility to be able to handle at least two different body types. In essence, this flexibility is achieved by providing at the welding station rapidly interchangeable locating frames for the various body types. A device of this type, having all the features specified in the preamble of claim 1, is disclosed in document D2, which is mentioned in the description of the contested patent.

In the device of document D2 there are for example four interchangeable locating frames carried on rotatable drums at each side of the welding station. Each of the locating frames carries a number of electrical spot welding guns electrically connected to two pairs of terminals in the lower part of the frame. When the frame is in its operative position hydraulically actuated clamps connect the terminals to a supply transformer (see Figures 9 and 10 and the corresponding description page 9). As the frame is moved into this position the pressure lines of the hydraulic actuating cylinders of the welding guns are connected to a pressure source via an automatic quick-coupling.

Now, it has already been proposed in document D1 to weld motor vehicle bodies by means of a laser. Here, a plurality of laser welding heads are mounted on the locating frame for the body parts, each of the welding heads receiving in sequence an open laser beam distributed from a common source. It is also apparent

from documents D4, D12 and D13 that laser welding systems in which a plurality of welding heads or torches were individually connected via a respective optical fibre and an optical distributor device to a common laser source were known and that the advantages of such a system over open beam distribution systems were being promoted.

Taking this state of the art into account the Board can agree with the contention of the appellants that the person skilled in the art would have been encouraged to consider replacement of the electrical welding means used in the device of document D2 by laser welding means and that, in principle at least, the use of laser welding torches connected via optical fibres to a laser source would have been his preferred choice for implementing this idea. What the appellants then effectively argue is that all of the features defined in the characterising portion of claim 1 then follow as a matter of course, when account is taken of the cited state of the art and general common knowledge, from the making of that choice. Here the Board cannot agree. Despite what has been said above about the obviousness of the use of laser welding in the context of a device such as disclosed in document D2 and the choice of an optical fibre distribution system for the laser beam to the welding torches there still remained a number of technical issues to be addressed, for the solution of which the relevant state of the art offered no ready solution. In particular, the appellants seem to assume that the person skilled in the art would automatically wish to provide some form of mechanically operated quick-coupling between a stationary laser source mounted at the welding station and an optical distributor device mounted on the locating frame since in their view this would correspond to the way electrical power is supplied to the welding guns of document D2. In the opinion of the Board that line of

argument is overly simplistic since it does not take proper account of the significant differences that exist between making a simple electrical connection and ensuring the proper transfer of a laser beam between two pieces of equipment working in the harsh environment involved. Nevertheless, the respondents did indeed choose this option and have designed appropriate quick-coupling means composing a motor driven cylindrical body aligned with the output of the laser source and movable between a disconnected position and a coupling position for connection to the input of the optical distributor device mounted on the locating frame. There is nothing in the state of the art that is even remotely similar to this construction of quick-coupling means for the transfer of a laser beam. The appellants have pointed in this respect to the optical fibre connectors shown in Figure 10 of document D12 but as far as can be judged these connectors are intended to make a semi-permanent connection during operation of the welding system and not to be automatically connected and disconnected during each working cycle.

For these reasons the Board comes to the conclusion that the subject-matter of claim 1 cannot be derived in an obvious manner from the state of the art and accordingly involves an inventive step (Article 56 EPC).

4. *Claim 5*

Having regard to the amendments made to claim 5 during the course of the appeal proceeding, the appellants no longer sought to challenge the inventiveness of the subject-matter it claims. The Board can agree with that assessment. It also agrees with the view of the

respondents that there is no need for further clarifying in the preamble of the claim that each welding station is dedicated to a particular vehicle type since this clearly follows already from the present version of the claim.

## Order

**For these reasons it is decided that:**

1. The decision under appeal is set aside.

2. The case is remitted to the first instance with the order to maintain the patent on the basis of the set of claims 1 to 5, an adapted description and Figure 3 of the drawings filed at the oral proceedings together with Figures 1, 2, 4 and 5 of the drawings as granted.

The Registrar: The Chairman:

S. Fabiani F. Gumbel