

Title of invention: Process and apparatus for manufacturing solar panels

The invention relates to a method and a device for producing solar modules.

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Methods and devices of this type are already known from practice. In this context, solar elements are combined to form lines and the solar modules are constructed from electrically interconnected lines. The solar elements used for this may be photovoltaic solar cells or partially sectioned parts of them, what are referred to as shingles.

It is an object of the invention to provide a method for producing solar modules and a corresponding direction which promote the efficient production of solar modules.

To achieve the object, what is proposed first of all is a method which comprises the means and features of the first independent claim, which concerns a method for producing solar modules. In particular, to achieve the object, what is thus proposed in the case of the method mentioned in the introduction is that the lines are adhesively bonded with an electrically conductive adhesive and that the electrically conductive adhesive is applied to the solar elements while the lines are being moved for transfer, in particular while a solar module is being charged with the lines.

The use of an electrically conductive adhesive enables firstly the mechanical interconnection and secondly the electrical interconnection of the lines of solar elements.

In this way, it is possible in one process step to firstly adhesively bond the lines to one another and secondly also to

at least prepare the electrical contact-connection of the solar elements of a line and ultimately also of two adjacent lines to one another.

5 In the finished solar module, a respective electrical voltage level can be applied within the individual lines of solar elements. Accordingly, there is no electrical voltage build-up beyond the solar elements of a line in the longitudinal direction of the lines. In the finished solar module, an
10 electrical voltage build-up can take place beyond the electrically interconnected lines and thus transversely or at right angles to a longitudinal direction of the lines.

According to the method, the solar elements can thus be
15 combined to form lines, with a respective electrical voltage level being applied within the individual lines of solar elements. The solar modules can then be constructed from electrically interconnected lines, with an electrical voltage build-up in the solar module taking place beyond the
20 electrically interconnected lines and thus transversely or at right angles to a longitudinal direction of the lines.

Within the meaning of the claimed invention, a line can therefore be distinguished from a conventional string of solar
25 elements. In a string, the solar elements are electrically interconnected in such a way that an electrical voltage build-up takes place in the longitudinal direction of the string beyond the electrically interconnected solar elements of the string.

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In one embodiment of the method, it is envisaged that a discharge unit, in particular at least one discharge nozzle and/or at least one screen printing unit and/or at least one web-fed printing unit of the discharge unit, for discharging
35 the conductive adhesive remains spatially fixed at least in

terms of horizontal position during the discharge. In this embodiment of the method, the electrically conductive adhesive is applied to the lines of solar elements which are moved relative to the discharge unit, which is spatially fixed in that case, during the transfer movement.

To modify a spacing between the lines, the discharge unit, in particular at least one discharge nozzle and/or at least one screen printing unit and/or at least one web-fed printing unit of the discharge unit is adjusted in terms of its vertical position in one embodiment of the method.

In another embodiment of the method, it is envisaged that a discharge unit, in particular at least one discharge nozzle and/or at least one screen printing unit and/or at least one web-fed printing unit of the discharge unit, for discharging the electrically conductive adhesive is moved during the discharge. The discharge unit can be moved in particular in a longitudinal direction and/or obliquely in relation to the longitudinal direction of at least one row of solar elements to which the electrically conductive adhesive is to be applied, and/or in a vertical direction.

In this embodiment of the method, it can be at least one discharge nozzle and/or at least one screen printing unit and/or at least one web-fed printing unit of the discharge unit that is moved during the discharge of the electrically conductive adhesive.

The solar elements of a line that are provided with the electrically conductive adhesive may be installed on the solar module at the same time or sequentially. Individual handling of solar elements which are provided with the electrically conductive adhesive and are intended to charge the solar module can be avoided if they are installed at the same time.

In this respect, the electrically conductive adhesive may be applied with an adhesive layer having a height of 0.5 mm or less and a width of 0.6 mm or less.

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Also proposed to achieve the object is a method for producing solar modules which comprises the means and features of the second independent claim, which concerns such a method. To achieve the object, what is thus proposed in the case of the method mentioned in the introduction in particular is that the lines are adhesively bonded with an electrically conductive adhesive and that the electrically conductive adhesive is applied to at least two solar elements in a process step.

15 The features of the two independent claims can be combined with one another in one embodiment of the method.

In one embodiment of the method, it may be envisaged that the at least two solar elements to which the electrically conductive adhesive is applied belong to different lines.

In one embodiment of the method, it may be envisaged to adhesively bond the solar elements of adjacent lines to one another at the same time. In this respect, it is possible to firstly provide a line, which is provided with an adhesive bead, of solar elements on a solar module that is to be produced. Then, a second line of solar elements can be positioned on the already arranged line of solar elements with a certain overlap such that it comes to lie on the adhesive bead of the already provided line of solar elements and in the process is adhesively bonded to the already positioned line of solar elements. In this way, it is avoided that the solar elements of the lines to be interconnected are individually provided with adhesive and individually connected to already positioned solar elements.

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In one embodiment of the method, it may be envisaged to adhesively bond the solar elements of adjacent lines to one another sequentially.

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In one embodiment of the method, it is envisaged to apply the electrically conductive adhesive to all the solar elements of a line in one process step. This variant of the method promotes a particularly efficient production of solar modules.

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It is also possible to apply the electrically conductive adhesive to solar elements of a line with a lateral offset in relation to a longitudinal center axis of the line. This promotes an overlapping connection of two adjacent lines of solar elements on a solar module that is to be produced.

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To achieve the object, what is also proposed is a device for producing solar modules which comprises the means and features of the independent claim which concerns such a device.

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To achieve the object, what is thus proposed in the case of the device mentioned in the introduction in particular is that the device comprises means by way of which it is designed to carry out a method for producing solar modules according to one of the claims that concerns such a method.

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The device may comprise a transfer unit, which is configured for the joint transfer of at least two lines of solar elements to a means for charging a solar module.

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In a preferred embodiment of the device, it comprises at least one discharge unit for discharging electrically conductive adhesive. The discharge unit is preferably configured to discharge electrically conductive adhesive onto at least two lines of solar elements at the same time. The discharge can in

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this respect be effected preferably onto at least two lines of solar elements that are fed at the same time for charging a solar module.

- 5 The discharge unit may also be configured to discharge electrically conductive adhesive onto at least two lines of solar elements sequentially.

The discharge unit may comprise or be at least one discharge
10 nozzle, in particular two or three or more discharge nozzles, and/or at least one screen printing unit and/or at least one web-fed printing unit. The discharge unit preferably comprises a number of discharge nozzles and/or screen printing units and/or web-fed printing units which corresponds to a number of
15 placement locations for lines on the transfer unit already mentioned above.

In this way, it is possible to apply electrically conductive adhesive to all the lines of solar elements arranged on the
20 transfer unit at the same time by means of the discharge unit. Screen printing units can be used to apply electrically conductive adhesive to the lines in a screen printing process. Web-fed printing units can be used to apply electrically conductive adhesive to the lines in a web-fed printing
25 process.

In one embodiment of the device, it is envisaged that the discharge unit, in particular at least one discharge nozzle and/or at least one screen printing unit and/or at least one
30 web-fed printing unit of the discharge unit, is positionally fixed at least in terms of horizontal position while electrically conductive adhesive is being discharged. In this embodiment of the device, a relative movement, which might be necessary for the application of the electrically conductive
35 adhesive, between the discharge unit, in particular at least

one discharge nozzle and/or at least one screen printing unit and/or at least one web-fed printing unit of the discharge unit, and the line of solar elements that is to be provided with the electrically conductive adhesive is a transfer
5 movement of the line that is performed relative to the positionally fixed discharge unit.

In order to be able to modify a spacing between the discharge unit, in particular between a discharge nozzle and/or at least
10 one screen printing unit and/or at least one web-fed printing unit of the discharge unit, and the line of solar elements that is to be provided with the electrically conductive adhesive, it can be expedient if a vertical position of the discharge unit, in particular at least one discharge nozzle
15 and/or at least one screen printing unit and/or at least one web-fed printing unit of the discharge unit, can be modified, for example by way of a correspondingly vertically adjustable mount of the device for the discharge unit, in particular for at least one discharge nozzle and/or for at least one screen
20 printing unit and/or for at least one web-fed printing unit of the discharge unit.

In another embodiment of the device, it is envisaged that the discharge unit, in particular at least one discharge nozzle
25 and/or at least one screen printing unit and/or at least one web-fed printing unit of the discharge unit, is movable, in particular while electrically conductive adhesive is being discharged. The discharge unit, in particular at least one discharge nozzle and/or at least one screen printing unit
30 and/or at least one web-fed printing unit of the discharge unit, to this end can be mounted movably and/or driven by a motor. The movement of the discharge unit, in particular of its at least one discharge nozzle and/or at least one screen printing unit and/or at least one web-fed printing unit, can
35 in this respect be aligned at least in a longitudinal

direction of a line of solar elements that is to be provided with electrically conductive adhesive and/or in a longitudinal direction of a placement location for a line of solar elements on a transfer unit, for example the one already mentioned
5 above, of the device.

In one embodiment of the device, it is envisaged that the discharge unit, in particular at least one discharge nozzle and/or at least one screen printing unit and/or at least one
10 web-fed printing unit of the discharge unit, is movable in a longitudinal direction of a line and/or of a placement location for a line on the transfer unit while electrically conductive adhesive is being discharged. To this end, the device may have a corresponding linear guide.

15 In one embodiment of the device, it is envisaged that two adjacent discharge nozzles and/or screen printing units and/or web-fed printing units of the discharge unit have the same spacing from another as two adjacent lines and/or placement
20 locations for lines on the transfer unit already mentioned above.

This makes it possible to apply electrically conductive adhesive at the same time to adjacent lines of solar elements
25 that are or have been constructed on the transfer unit and are jointly fed for example for charging of a solar module.

A perpendicular projection of at least one discharge unit, in particular at least one discharge nozzle and/or at least one
30 screen printing unit and/or at least one web-fed printing unit of the discharge unit, onto a placement location for a line of solar elements on the transfer unit can in this respect be laterally offset in relation to a longitudinal center axis of the placement location and/or laterally offset in relation to

a longitudinal center axis of a line of solar elements that is arranged at the placement location.

The device may comprise a control unit, by way of which the device is configured for carrying out a method according to one of the claims that concerns a method for producing solar elements.

The invention will be described in more detail below on the basis of exemplary embodiments but is not restricted to the exemplary embodiments shown. Further exemplary embodiments will emerge by combining the features of individual or multiple claims with one another and/or by combining individual or multiple features of the exemplary embodiments.

In the figures:

Figures

1 and 2 show a first exemplary embodiment of a device for producing solar modules, wherein the device comprises a transfer unit in the form of a negative pressure table, by means of which a total of three lines of solar elements can be transferred jointly to an unloading position in order to charge a solar module with the lines,

Figures

3 and 4 show a second exemplary embodiment of a device for producing solar modules, wherein in this case a transfer unit of the device, by means of which three lines of solar elements can be fed jointly for charging of a solar module, is in the form of a belt conveyor,

Figures

5 and 6 show a third exemplary embodiment of a device for producing solar modules, wherein this device likewise comprises a transfer unit in the form of a belt conveyor, it being the case here however that a transfer movement of the transfer unit is aligned transversely, specifically at right angles, in relation to the orientation of the lines of solar elements arranged on the transfer unit, and

Figure 7 shows a perspective side view of the discharge unit illustrated in figures 1 and 2 with a total of three discharge nozzles, the perpendicular projections of which onto placement locations on the transfer unit for lines of solar elements have a lateral offset in relation to a longitudinal center axis of the respective placement location,

Figure 8 shows a plan view of the discharge unit depicted in figure 7, and

Figure 9 shows a front view of the discharge unit depicted in figures 7 and 8.

In the following description of various embodiments of the invention, elements which have the same function are provided with the same reference numerals even if the design or shaping differs.

All of the figures show at least parts of a device, denoted by 1 overall, for producing solar modules 2.

Each device 1 comprises means by way of which the device 1 is configured to carry out the method described below for producing solar modules 2.

In the process, solar elements 3 are combined to form lines 4 and solar modules 2 are constructed from the lines 4, which are then electrically interconnected.

5 At least two lines 4, in the examples shown in the figures at least three lines 4, are constructed and then fed jointly for charging of a solar module 2.

10 In all of the exemplary embodiments, shown in the figures, of devices 1, the lines 4 are fed jointly for charging of the solar module 2 by means of a respective motorized transfer unit 5.

15 In the exemplary embodiment illustrated in figures 1 and 2 of such a device 1, a negative pressure table is used as transfer unit 5 and is movable between a loading point 8 and an unloading point 9.

20 The device 1 shown in figures 3 and 4 has a belt conveyor as transfer unit 5. The transfer movement of the belt conveyor makes it possible to feed the lines 4, which are constructed on the belt conveyor, jointly for charging of the solar module 2.

25 The device 1 shown in figures 5 and 6 is likewise equipped with a transfer unit 5 which is in the form of a belt conveyor.

30 While in the case of the device 1 illustrated in figures 3 and 4 a transfer movement of the transfer unit 5 takes place in the longitudinal direction of the lines 4 arranged on the transfer unit 5, the transfer movement of the transfer unit 5 of the device 1 illustrated in figures 5 and 6 is transverse, specifically at right angles, to the longitudinal direction of

the lines 4 of solar elements 3 that are constructed on the transfer unit 5.

A relative alignment of the solar elements 3 within a line 4 and also of the lines 4, which are constructed on the transfer unit 5, in relation to one another is maintained during the feeding operation.

Each of the devices 1 shown in the figures comprises a respective negative pressure generation unit 6, by means of which lines 4 of solar elements 3 can be fixed at least temporarily to the respective transfer unit 5 by negative pressure. The negative pressure generation units 6 are illustrated only highly schematically in the figures.

Each device 1 shown also comprises a discharge unit 7 for discharging electrically conductive adhesive onto lines 4 of solar elements 3, which are arranged on the transfer unit 5. A number of jointly fed lines 4 is matched to a discharge rate of an electrically conductive adhesive in the process. The electrically conductive adhesive is applied to the lines 4 of solar elements 3 in order to mechanically and electrically interconnect the solar elements 3 and lines 4.

In an embodiment of the device 1 which is not illustrated in the figures, the discharge of electrically conductive adhesive onto lines 4 is provided by a screen printing process and/or a web-fed printing process. TO this end, this device 1 comprises a discharge unit 7 for electrically conductive adhesive which is configured for screen printing and/or web-fed printing. Such a discharge unit 7 comprises at least one screen printing unit and/or at least one web-fed printing unit.

The discharge units 7 of the devices 1 are each arranged between the loading point 8, already mentioned above, and the unloading point 9, likewise mentioned above, for lines 4.

5 The discharge units 7 of the devices 1 shown in figures 1 and 2 and also 3 and 4 comprise a number of discharge nozzles 10 which corresponds to a number of placement locations 11 for lines 4 of solar elements 3 on the transfer unit 5. Consequently, the discharge units 7 of the devices 1 shown in
10 figures 1-4 each have three discharge nozzles 10.

In the embodiments of devices 1 that are shown in figures 1 and 2 and also 3 and 4, the discharge nozzles 10 of the discharge units 7 remain positionally fixed while electrically
15 conductive adhesive is being discharged.

In order to be able to adapt a spacing between the discharge units 7, in particular their discharge nozzles 10, and the lines 4, onto which electrically conductive adhesive is to be
20 applied, as required, it is possible to adjust at least the discharge nozzles 10 of the discharge units 7 in a vertical direction. To this end, the devices 1 comprise a vertically adjustable mount 26 for the discharge nozzles 10. The vertically adjustable mounts 26 can be clearly seen for
25 example in figures 8 and 10.

In the case of the device 1 shown in figures 5 and 6, the discharge unit 7, specifically at least the one discharge nozzle 10 of the discharge unit 7, can be moved in a
30 longitudinal direction of the lines 4 and thus in the longitudinal direction of the placement locations 11 for lines 4 on the transfer unit 5 while electrically conductive adhesive is being discharged. A vertical adjustment of at least the discharge nozzle 10 using a correspondingly
35 adjustable mount 26 is also possible here in order to modify a

spacing between the discharge nozzle 10 and the line 4 located beneath it as required.

Perpendicular projections of the discharge nozzles 10 of the
5 discharge units 7 onto the placement locations 11, located
beneath them in the use position, for lines 4 on the
respective transfer unit 5 are in this case laterally offset
in relation to longitudinal center axes of the placement
locations 11 and thus also laterally offset in relation to
10 longitudinal center axes of the lines 4 arranged at the
placement locations 11. This allows the application of
electrically conductive adhesive with a lateral offset in
relation to longitudinal center axes of the lines 4. The
lateral offset can be seen particularly clearly in figure 9 on
15 the basis of the front view of the discharge unit 7 with a
transfer unit 5 located beneath it.

The illustrations in figures 7-9, which reproduce the
discharge unit 7 of the device 1 shown in figures 1 and 2,
20 additionally depict that two adjacent discharge nozzles 10 of
the discharge unit 7 have the same spacing between one another
as two adjacent lines 4 and thus also as two adjacent
placement locations 11 for lines 4 on the transfer unit 5.

25 The negative pressure generation units 6 of the devices 1 are
connected to suction openings 23 which the respective transfer
unit 5 comprises. Each transfer unit 5 has, for each of its
placement locations 11, at least one respective row 24 of such
suction openings 23. In this way, the lines 4 of solar
30 elements 3 can be fixed reliably to the transfer units 5 while
they are being fed.

In the method implemented on the devices 1 for producing solar
modules 2, the lines 4, as already mentioned above, are
35 adhesively bonded by means of an electrically conductive

adhesive. The electrically conductive adhesive is applied to the solar elements 3 in the process during a transfer movement of the lines 4 to a means for charging a solar module 2 with the lines 4.

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As already mentioned above, electrically conductive adhesive is applied to the lines 4 of solar elements 3 in the case of the devices 1 shown in figures 1-4 from discharge nozzles 10, which are positionally fixed in terms of horizontal position but can be modified in terms of vertical position, of the
10 respective discharge unit 7. The relative movement, which is required to discharge the electrically conductive adhesive, between the lines 4 and the discharge nozzles 7 is in this respect the transfer movement which is performed by the
15 transfer unit 5 and which causes the lines 4 to move from the loading position 8 to the unloading position 9.

The functioning of the device 1 shown in figures 5 and 6 is different in terms of the discharge of electrically conductive
20 adhesive. The individual discharge nozzle 10 of the discharge unit 7 of this device 1 is moved in a longitudinal direction of a line 4 of solar elements 3 that is to be provided with electrically conductive adhesive while electrically conductive adhesive is being discharged onto the line 4 of solar elements
25 3 that is located underneath the discharge nozzle 10. For this, the device 1 comprises a linear guide 25. The discharge nozzle 10 of the discharge unit 7 of the device 1 shown in figures 5 and 6 is moved along the linear guide 25 to discharge electrically conductive adhesive onto the line 4 of
30 solar elements 3 that is positioned underneath the discharge nozzle 10. A track, along which the discharge nozzle 10 is moved while electrically conductive adhesive is being discharged, can in this respect have a lateral offset in relation to a longitudinal center axis of a line 4 to be
35 provided with electrically conductive adhesive.

While electrically conductive adhesive is being discharged, the position of the discharge nozzle 10 transversely in relation to the longitudinal extent of the line 4 to be provided with electrically conductive adhesive is kept constant. In this connection, it may be envisaged that the discharge nozzle 10 is movable synchronously with the transfer unit 5 in the direction of the transfer movement of the transfer unit 5.

On all the devices 1, the solar elements 3 of a line 4 that are to be provided with electrically conductive adhesive are installed at the same time on the solar module 2 to be produced.

During the production of solar modules 2, the electrically conductive adhesive is applied to at least two of the solar elements 3 in one process step.

The at least two solar elements 3 are part of different lines 4 in this respect. In the case of the devices 1 shown in figures 1-4, solar elements 3 of a total of three lines 4 are provided with electrically conductive adhesive at the same time in one process step.

When the solar module 2 is being charged, the solar elements 3 of adjacent lines 4 are adhesively bonded to one another at the same time. To this end, the charging units 19 shown in the figures can use their grippers 20 to place the lines 4 fed by the respective transfer unit 5 one on another in succession with a certain overlap, wherein the solar elements 3 of adjacent lines 4 are adhesively bonded to one another at the same time.

In the case of all the devices 1 shown in the figures, for the construction of the lines 4 reference pieces 12 are used to create an offset between adjacent lines 4 firstly on the respective transfer unit 5 and later also on the fully charged solar module 2.

The reference pieces 12 are solar elements which have a shorter length than other solar elements, which are denoted by 3 in the figures and are not in the form of reference pieces 12.

The figures show that at least two, specifically three or even more, mutually offset lines 4 can be fed jointly for charging of a solar module 2.

In one embodiment of the method, groups of at least two lines 4 which are fed jointly for joint charging can be constructed at the same time. It is also possible to use a transfer unit 5 shown in the figures for this.

To provide the solar elements 3 and the reference pieces 12, each of the devices 1 shown in the figures comprises a magazine 13. Using a transfer unit 14, which comprises a handling robot 15, specifically a pivot-arm robot, the reference pieces 12 and solar elements 3 provided and stored in the respective magazine 13 can be removed and arranged on the respective transfer unit 5 in lines 4. Each magazine 13 has a total of two conveyor belts 16, on which both the reference pieces 12 and the regular solar elements 3, which are somewhat longer in comparison, are stored in stacks.

To monitor solar elements 3 and also reference pieces 12, each device 1 comprises a monitoring unit 17. The monitoring units 17 are arranged between the magazine 13 and the transfer unit

14 of the respective device 1 and each comprise at least one optical monitoring means, for example a camera 18.

The handling robot 15 of the transfer unit 14 can be used to present the solar elements 3 and/or reference pieces 12 that are picked from the magazine 13 to the camera 18 of the monitoring unit 17, in order to check the solar elements 3 and reference pieces 12 before they are arranged on the respective transfer unit 5. Each of the devices 1 has a charging unit 19 downstream of the respective transfer unit 5 and also of the unloading point 9. Each charging unit 19 comprises multiple grippers 20, which are in the form of suction grippers.

The charging units 19 are configured to take up one or more, or all of the, lines 4 of solar elements 3 provided by the respective transfer unit 5 at the unloading point 9 and transfer them to a downstream transporting unit 21 of the respective device 1. The respective transporting unit 21 serves to feed at least one solar module 2 charged with lines 4 of solar elements 3 to a downstream processing station, for example an oven.

As already mentioned above, a transfer movement of the transfer unit 5 of the devices 1 shown in figures 1-4 is aligned in a longitudinal direction of placement locations 11 and thus also in a longitudinal direction of lines 4 on the transfer unit 5.

In the exemplary embodiment shown in figures 5 and 6 of the device 1, the transfer movement of the transfer unit 5 is aligned transversely, specifically at right angles, in relation to a longitudinal direction of placement locations 11 and thus transversely, specifically at right angles, in relation to a longitudinal direction of the lines 4, which are arranged on the placement locations 11 of the transfer unit 5.

The transfer movements of the transfer unit 5 of the devices 1 shown in figures 1-4 are aligned transversely, specifically at right angles, in relation to the transporting direction of the respective transporting unit 21, which is downstream of the transfer unit 5.

In the exemplary embodiment shown in figures 5 and 6 of the device 1, the transfer movement of the transfer unit 5 is aligned in the direction of a transporting movement of the transporting unit 21 used there.

The transporting unit 21 of the device 1 illustrated in figures 5 and 6 is, similarly to the transfer unit 5, in the form of a belt conveyor.

To carry out the method described above, each of the devices 1 shown in the figures also comprises a control unit 22. This control unit 22 makes it possible to actuate the aforementioned functional units of the respective device 1 as intended by the method.

The invention is concerned with improvements to the technical field of the production of solar modules 2. For this, among other things, a method for producing solar modules 2 is proposed, in the course of which lines 4 of solar elements 3 are adhesively bonded by means of an electrically conductive adhesive. The method envisages that the electrically conductive adhesive is applied to the solar elements 3 during a transfer movement of the lines 4.

/ List of reference signs

List of reference signs

	1	Device
	2	Solar module
5	3	Solar element
	4	Line
	5	Transfer unit
	6	Negative pressure generation unit
	7	Discharge unit
10	8	Loading position
	9	Unloading position
	10	Discharge nozzle
	11	Placement location
	12	Reference piece
15	13	Magazine
	14	Transfer unit
	15	Handling robot
	16	Conveyor belt
	17	Monitoring unit
20	18	Camera
	19	Charging unit
	20	Gripper
	21	Transporting unit
	22	Control unit
25	23	Suction opening
	24	Row
	25	Linear guide
	26	Mount

Claims

1. A method for producing solar modules (2), wherein solar elements (3) are combined to form lines (4), wherein each
5 line (4) comprises at least two solar elements (3), and wherein the solar modules (2) are constructed from electrically interconnected lines (4), **characterized in that** the lines (4) are adhesively bonded by means of an electrically conductive adhesive and in that the
10 electrically conductive adhesive is applied to the solar elements (3) during a transfer movement of the lines (4), in particular in order to charge a solar module (2).
2. The method as claimed in claim 1, characterized in that a
15 discharge unit (7) for discharging the electrically conductive adhesive, in particular at least one discharge nozzle (10) and/or at least one screen printing unit and/or at least one web-fed printing unit of the discharge unit (7), during the discharge remains
20 spatially fixed at least in terms of horizontal position and/or is adjusted in terms of vertical position to modify a spacing between the lines (4), and/or in that a discharge unit (7) for discharging the electrically conductive adhesive, in particular at least one discharge
25 nozzle (10) and/or at least one screen printing unit and/or at least one web-fed printing unit of the discharge unit (7), is moved during the discharge, in particular in a longitudinal direction and/or obliquely in relation to the longitudinal direction of at least one
30 line (4) of solar elements (3) and/or in a vertical direction.
3. The method as claimed in either of the preceding claims, characterized in that the solar elements (3) of a line
35 (4) that are provided with the electrically conductive

adhesive are installed on the solar module (2) at the same time.

4. A method for producing solar modules (2), in particular
5 as claimed in one of the preceding claims, wherein solar
elements (3) are combined to form lines (4) and wherein
the solar modules (2) are constructed from electrically
interconnected lines (4), characterized in that the lines
(4) are adhesively bonded by means of an electrically
10 conductive adhesive and in that the electrically
conductive adhesive is applied to at least two solar
elements (3) in one process step.

5. The method as claimed in one of the preceding claims,
15 characterized in that the at least two solar elements (3)
are part of different lines (4).

6. The method as claimed in one of the preceding claims,
characterized in that the solar elements (3) of adjacent
20 lines (4) are adhesively bonded to one another at the
same time.

7. The method as claimed in one of the preceding claims,
characterized in that the electrically conductive
25 adhesive is applied to all solar elements (3) of a line
(4) in one process step and/or wherein the electrically
conductive adhesive is applied to solar elements (3) of
the line (4) with a lateral offset in relation to a
longitudinal center axis of a line (4).

8. A device (1) for producing solar modules (2), wherein the
device (1) comprises means by way of which it is
configured to carry out a method as claimed in one of the
preceding claims.

9. The device (1) as claimed in the preceding claim, wherein the device (1) comprises a transfer unit (5) for the joint transfer of at least two lines (4) of solar elements (3) to a means for charging a solar module (2).

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10. The device (1) as claimed in either of the preceding claims, wherein the device (1) comprises at least one discharge unit (7) for discharging electrically conductive adhesive.

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11. The device (1) as claimed in the preceding claim, wherein the discharge unit (7) comprises or is at least one discharge nozzle (10) and/or at least one screen printing unit and/or at least one web-fed printing unit, in particular wherein the discharge unit (7) comprises a number of discharge nozzles (10) and/or screen printing units and/or web-fed printing units that corresponds to a number of placement locations (11) for lines (4) on the transfer unit (5).

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12. The device (1) as claimed in one of the preceding claims, wherein the discharge unit (7), in particular at least one discharge nozzle (10) and/or one screen printing unit and/or one web-fed printing unit of the discharge unit (7), is spatially fixed at least in terms of horizontal position while electrically conductive adhesive is being discharged, and/or wherein the discharge unit (7), in particular at least one discharge nozzle (10) and/or at least one screen printing unit and/or at least one web-fed printing unit of the discharge unit (7), is movable, in particular while electrically conductive adhesive is being discharged.

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13. The device (1) as claimed in one of the preceding claims, wherein the discharge unit (7), in particular at least

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one discharge nozzle (10) and/or at least one screen printing unit and/or at least one web-fed printing unit of the discharge unit (7), is movable in a longitudinal direction of a line (4) and/or of a placement location (11) for a line (4) on the transfer unit (5) while electrically conductive adhesive is being discharged, and/or wherein the discharge unit (7), in particular at least one discharge nozzle (10) and/or at least one screen printing unit and/or at least one web-fed printing unit of the discharge unit (7), can be modified in terms of its vertical position, for example by a vertically adjustable mount (26) of the device (1).

14. The device (1) as claimed in one of the preceding claims, wherein two adjacent discharge nozzles (10) and/or screen printing units and/or web-fed printing units of the discharge unit (7) have the same spacing from one another as two adjacent lines (4) and/or placement locations (11) for lines (4) on the transfer unit (5).

15. The device (1) as claimed in one of the preceding claims, wherein a perpendicular projection of at least one discharge unit (7), in particular at least one discharge nozzle (10) and/or at least one screen printing unit and/or at least one web-fed printing unit of the discharge unit (7), onto a placement location (11) for a line (4) on the transfer unit (5) is laterally offset in relation to a longitudinal center axis of the placement location (11) and/or laterally offset in relation to a longitudinal center axis of a line (4) that is arranged at the placement location (11).

16. The device (1) as claimed in one of the preceding claims, wherein the device (1) comprises a control unit (22), by way of which it is configured to carry out a method as

claimed in one of the preceding claims.