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(54) **Modular system for moulding electronic components and kit-of-parts for assembling such a modular system.**

(57) The invention relates to a modular system for moulding electronic components, comprising at least three separate system modules; a press module for moulding the electronic components; a loader module for loading the electronic components to be moulded from a cassette to a press module; and a service module configured to at least partially control each of the other system modules. The invention also relates to a kit-of-parts for assembling such a modular system.

NL B1 2014802

Modular system for moulding electronic components and kit-of-parts for assembling such a modular system

The present invention relates to a modular system of production modules for moulding electronic components. The invention also relates to a kit-of-parts for assembling such a modular system.

The moulding of electronic components mounted on a carrier refers to the process of at least partial encapsulating electronic components, and more particularly relates normally the moulding of semiconductor circuits (chips) / integrated circuits (IC's). According to the prior art the moulding of the electronic components takes place in a moulding press provided with at least two co-operating mould parts. Into at least one of the mould parts one or plural mould cavities are recessed. The electronic components are held by a carrier, which carrier may have different shapes like for instance – and not limitative - a lead frame, a board (like a BGA) or a wafer. The carrier with electronic components for encapsulating are placed between the mould parts, which are moved towards each other, e.g. such that they clamp the carrier. A, normally heated, liquid moulding material is pressed into the recesses or mould cavities, e.g. by transfer moulding material (also referred to as epoxy or resin) or by compressing moulding material already placed in the mould before the closure of the mould parts. After at least partial (chemical) curing of the moulding material in the mould cavity/cavities, the mould parts are moved apart and the carrier with encapsulated electronic components is removed from the encapsulating press. In a subsequent processing step the encapsulated products may be separated from each other, for instance by sawing, laser cutting and/or water cutting. The at least partial covered electronic components may be used in various applications. This method of moulding is practised on large industrial scale and enables well controlled moulding of electronic components. Moulding equipment for moulding electronic components knows several levels of automation and also the capacity of the moulding equipment available in the market differs substantially.

The present invention has for its object to provide a modular system of production modules for moulding electronic components that provides the opportunity if efficient change of functionality and capacity of moulding equipment for moulding electronic components.

This object is achieved with a modular system for moulding electronic components, comprising at least three separate system modules, said system modules comprises: at least one press module for moulding the electronic components; at least one loader module for loading the electronic components to be moulded from a cassette to a press module; and a service module including an intelligent electronic control system configured to at least partially control each of the other system modules; wherein the system modules are provided with cooperating couplings for mutual orientation and securing of adjacent system modules. The service module is provided with an electronic control system for controlling at least a part of the operation of each of the further modules apart from the service module that are present in the modular system.

One of the advantages of the modular system according the present invention is, that it provides and combines flexibility and scalability at the same time on plural levels. A first advantage is that the production capacity is scalable, among others by the number of press modules incorporated in the system but also by the capacity of other modules (e.g. loader and off-loader modules). In an embodiment of the modular system two press modular provided but also more press modules may be part of a single modular system like for instance three press modules, four press modules, five press modules or even more than five press modules. A second and important advantage is that the automation level may be modular influenced in relative small increasing steps by the type of modules incorporated in the system (e.g. by including or excluding modules like off-loader module feed module, which will be explained later in the description in more detail). A third advantage of substantial relevance is that the type of products that can be processed on the modular system may be influenced (e.g. by changing or adding loader module and off-loader module) for moulding electronic components placed on boards (like BGA), carriers like E-WLP for fan-out packaging, leadframes or even electronic components stacked or etched on silicon-, ceramic- or glass- wafers. A fourth important advantage is that the system even may vary in relation to the type of moulding process that takes place. Press modules may be applied with top mould, bottom mould and moulding material feed, e.g. a transfer moulding press for over-moulding as well as exposed die moulding, but also alternatives like compression moulding press are possible within the boundaries of the present invention. As thus is demonstrated by the four advantages listed above the flexibility and scalability of the modular system

provides plural levels of freedom. This makes it easier to decide to buy a modular system as the system may be capacity and the functionality of the modular system may be adapted during the life time of the equipment when production circumstances may vary. Due to the standardisation it is even an option that system modules may later be sold if they become superfluous as they may easy be integrated in other modular systems according the present invention.

A further advantage is that the flexibility is also very easy to realise. The service module that is configured to at least partially control each of the other modules of the modular system enables very simple expansion (enlargement) or adaptation (adjustment) of the system. As far a present, press module(s), loader module, off-loader module, feed module, open-cassette loader and off-loader as well as enclosed cassettes modules by FOUP-loader and FOUP-off-loader module (the different type of modules will be explained later in this description) are all at least partially controlled by the service module.

The controlling service module provides easy “plug and play” of further modules by electronically coupling them to the system (or uncoupling superfluous modules). In line with the easy expansion or adaptation of the electronic control of the modular system according the present invention also mechanical expansion or adaptation of the modular system simple as for the cooperating couplings the system modules are provided with enable simple orienting and securing the modules in-line. For this purpose the on at least one side the loader module may be provided with couplings for orienting and securing the loader module in-line to the press module. According the present invention thus both simple electronic and physical coupling and decoupling are facilitated.

In an embodiment the system may further comprise at least one off-loader module for off-loading moulded electronic components from the press into a cassette, which off-loader module is on at least one side provided with couplings for mutual orientation and securing the off-loader module to a press module. The basic configuration of the modular system comprises a press module, a loader module and a service module. The service module may be combined in one unit (combined use of a “single module” floor area) with the loader unit as the loader module and the service module require less volume than a press module. The reason these modules are part of a basic configuration

of the modular system is that no moulding is possible without a press module and a service module. Furthermore the electronic components to be moulded a so vulnerable that manual loading is not an option and also the economic argument that the additional functionality of the service module is only beneficial if more than only a single press module is used. In case of a system including more than one press module, the press module an off-loader may be secured to by the couplings is the press module placed in-line on the largest distance of the loader module.

In a further embodiment the system may further comprise at least one feed module for feeding encapsulating material to a press module. Feeding of the moulding material may be embodied as a pellet feeder (especially for transfer moulding processes) but also alternative feed modules may be provided like for instance a liquid moulding material feed module and/or a feed module for compression moulding that feeds sized moulding material bodies (like for instance moulding material sheets) to the press module. In line with the possibility to integrate the loader module with the service module the feed module may be integrated into the off-loader module with the additional advantage that a feed module is normally providing more hinder to the clean room conditions and thus integration of the feed module with a module wherein the products are less vulnerable is positive for creating optimal process conditions. A traditional pellet feed is normally provided with external pellet hopper, weight detection, filter unit and various other additional functions.

In yet another embodiment of the modular system according the present invention the system may further comprise a FOUP-loader module for loading wafers with electronic components to be moulded, from a FOUP-carrier to an adjoining module. A FOUP-carrier is a “Front Opening Universal Product carrier” and is used for loading wafers. The FOUP-loader incorporated in the modular system according the present invention may be of dedicated design or may be an “off the shelf product” as far as the interfaces as applied in the modular system according the present invention are provided; the provision to couple the FOUP-loader to the service module and the cooperating couplings for mutual orientation and securing of adjacent system modules. In line with the FOUP-loader the system may also comprise a FOUP-off-loader module for offloading moulded wafers with electronic components from an adjoining module to a FOUP-cassette.

The loader module may comprise a loader head, which loader head is configured to extend into at least one press module. In a specific embodiment the loader module may cooperate with a guide extending along and carried by one or more press modules. In the situation an additional press module is added to the modular system the guide will then also be extended with one press module width so the loader head of the loader module as such does not require any modification in such situation. A technical solution that enables very simple adaption of the (capacity) configuration of the modular system. For similar reasons also an off-loader module – if part of the modular system - may comprise a cleaning and off-loader head, which cleaning and off-loader head is configured to extend into at least one press module. Also such off-loader head may cooperate with a guide extending along and carried by the at least one press module, however also a single guide for both a loader head and an off-loader head may be applied. The press modules may therefore be provided with cooperating guide parts. Again a technical solution that enables very simple adaption of the (automation level) configuration of the modular system. As for the loader head and the off-loader head they may be provided with a head to handle for instance substrates or leadframes but the loader head and the off-loader head may also be configured to handle wafer type of carrier.

A further option may be to provide each press module with a housing of which the opposite sides are provided with coverable transfer openings. Such coverable transfer openings may be provided to be covered, preferably by clear corresponding safety windows and/or partial metal windows, in situations wherein no exchange of products through an opening is required, e.g. when a press module on one side is not provided with an adjoining module, but on the other hand the opening may be opened for unhindered transfer of products through an opening if and when two neighbouring modules require exchange of product between the modules. This feature also supports all the automation levels from manual operated machine, through partial automation by automatic product loading, up to the maximum level of full automatic product offloading, and/or additional automation of pellet- or liquid epoxy feed.

For even further enhanced simplicity in the extension or the reduction of a modular system according the present invention as far as that they are present, press module(s), service module, loader module and off-loader module may have an identical width.

To enable secure and solid coupling of press modules the couplings provided onto the press module may be integral part of the press structure as the press structure (the "frame") controls the positioning of the "hart" of the moulding process this provides the possibility to more secure alignment of adjacent modules to a press module. For easy coupling of the relative heavy modules without special tools (especially the press modules are heavy, normally at least several tons) the couplings may comprise male and female coupling elements. Furthermore the engaging couplings may also include bolds for securing the adjoining modules together before optimal inline positioning is competed at the time of assembly installation of the equipment.

In a simple yet reliable construction a press module may comprise on opposite sides of the module two couplings, which two couplings are horizontal or even all couplings of the system modules are located in one horizontal plane. This provides the possibility for accurate horizontal relative positioning of the modules of a modular system yet is also enables the correct small deviations in the modules and/or disturbing environmental conditions at the time of installation or during production.

The present invention also provides a kit-of-parts for assembling the modular system according the present invention, comprising: at least one press module for moulding the electronic components; at least one loader module for loading the electronic components to be moulded from a cassette to a press module, a service module including an intelligent electronic control system configured to at least partially control each of the other system modules, wherein the system modules are provided with cooperating couplings for mutual orientation and securing of adjacent system modules. With such kit-of-parts the modular system according the present invention may be realised and thus the advantages of such modular system. In relation to the advantages of the kit-of-parts according to the present invention reference is made to the advantages already mentioned above in relation to the modular system according to the present invention.

The present invention will be further elucidated on the basis of the non-limitative exemplary embodiments shown in the following figures. Herein shows:

figure 1 a perspective view on a kit-of-parts for assembling the minimal configuration of a modular system according the present invention;
figure 2 a perspective view on a loader head and an off-loader head including a guide structure to guide the heads along the modular system;
figure 3 a perspective view on a FOUP-loader;
figure 4 a perspective view on a modular system for moulding electronic components according the present invention comprising a service module, a loader module, two press modules and an off-loader module; and
figure 5 a perspective view on an alternative embodiment of a modular system for moulding electronic components according the embodiment shown in figure 4 but also including a FOUP-loader module and a FOUP off-loader module.

Figure 1 shows a perspective view on a kit-of-parts 1 for assembling the minimal configuration of a modular system for moulding electronic component comprising a service module 2 with an intelligent electronic control system for controlling all the other system modules of a modular moulding system, a loader module 3 for loading the electronic components to be moulded from a cassette and a press module 4 for moulding the electronic components. The loader module 3 has an open space 5 wherein the service module 2 fits as will be sown in subsequent figure 4 and 5. The service module 2 includes a control panel 6 and a connection pole 7 for connecting the service model on an external power source. The loader model 3 may be provided with a door (not shown) in the side of the loader module faced away from the drawing, The door is provided to place a cassette with carrier of electronic components to be moulded in the loader module 3. The loader module 3 controls the movement of a loader head 10 as is shown in figure 2. The loader module 3 and the press module 4 are provided with wherein the system modules are provided with cooperating couplings 8 for mutual orientation and securing of adjacent system modules 3, 4. Inside the press module 4 a central space 9 is provided to locate guide elements as will be explained in more detail in figure 2.

Figure 2 shows a perspective view on a loader head 10 and an off-loader head 11 including a guide structure 12 to guide the heads 10, 11 along a modular system for moulding electronic component. The loader head 10 is controlled by a loader module 3 (as depicted in figure 1) and the off-loader head 11 is to be controlled by an off-loader module as will be shown in figures 4 and 5. The guide structure 12 is an in-line assembly of plural (in this figure four) guide parts 13 - 16. A first guide part 13 is to be included in the loader module 3, the second and third guide parts 14, 15 are to be incorporated in press modules 4 and the last guide part 16 is to be incorporated in an off-loader module. Dependent on the number and type of modules part of a specific modular system for moulding electronic components the length of the guide structure is to be selected.

Figure 3 shows a FOUP-loader module 20 wherein enclosed cassettes 21 ("Front Opening Universal Product carrier") which enclosed cassettes 21 are used for storage of (vulnerable) wafers 22. A FOUP-loader module 20 is to be coupled with a loader module 3 as shown in figure 1. The FOUP-loader module 20 is designed to remove wafers 22 from the enclosed cassettes 21 and to present a selected wafer 22 sideward as is shown in this figure. The presented wafer 22 as shown will then be located inside an adjoining loader module 3 (not shown in this figure) to be handled with a loader haed 10 as shown in figure 2.

Figure 4 shows a perspective view on a modular system 30 for moulding electronic components according the present invention comprising a service module 31, a loader module 32, two press modules 33, 34 and an off-loader module 35. The modular system 30 is shown from the front side on which side the loader head 10 and off-loader head 11 may be moved along the modules 32- 35. The modules 31 – 35 are coupled in an on-line configuration so the coupling elements 8 (not visible here; see figure 1) will now cooperate. Also shown is a door 36 in the off-loader module 35 that provides access to a cassette which is to be loaded with carrier of moulded electronic components so that the moulded product can be removed from the modular system. The off-loader module 35 – as also the loader module 32 and the press modules 33, 34 - is provided with a housing 37 of which the opposite sides are provided with coverable transfer openings 38. By opening these coverable transfer openings 38 a connection to an adjoining module may

be made and in an end position (wherein an adjoining module to be coupled lacks) the transfer openings 38 will be covered.

Figure 5 shows a perspective view on an alternative embodiment of a modular system 40 for moulding electronic components including all the modules as part of the modular system 30 shown in figure 4 but now also including a FOUP-loader module 41 and a FOUP off-loader module 42.

Conclusies

1. Modulair systeem voor het omhullen van elektronische componenten, omvattende ten minste drie afzonderlijke systeemmodules, waarbij de systeemmodules omvatten:

- ten minste één persmodule voor het omhullen van de elektronische componenten;
- ten minste één aanvoermodule voor het laden van de te omhullen elektronische componenten vanuit een cassette naar een persmodule; en
- een bedieningsmodule voorzien van een intelligent elektronisch besturingssysteem dat is uitgevoerd om ten minste gedeeltelijk elk van de andere systeemmodules aan te sturen;

waarbij de systeemmodules zijn voorzien van samenwerkende koppelingen voor onderlinge oriëntatie en bevestiging van aangrenzende systeemmodules.

2. Modulair systeem volgens conclusie 1, **met het kenmerk** dat het systeem verder ten minste één afvoermodule omvat voor het afvoeren van omhulde elektronische componenten uit de pers in een cassette, welke afvoermodule aan ten minste één zijde is voorzien van koppelingen voor onderlinge oriëntatie en bevestiging van de afvoermodule ten opzichte van een persmodule.

3. Modulair systeem volgens conclusie 1 of 2, **met het kenmerk** dat het systeem verder ten minste één toevoermodule omvat voor het toevoeren van omhulmateriaal aan een persmodule.

4. Modulair systeem volgens één van de voorgaande conclusies, **met het kenmerk** dat het systeem verder een FOUP-aanvoermodule omvat voor het laden van wafers met te omhullen elektronische componenten, vanuit een FOUP-drager naar een aangrenzende module.

5. Modulair systeem volgens één van de voorgaande conclusies, **met het kenmerk** dat het systeem verder een FOUP-afvoermodule omvat voor het afvoeren van omhulde

wafers met elektronische componenten vanuit een aangrenzende module naar een FOUP-cassette.

6. Modulair systeem volgens één van de voorgaande conclusies, **met het kenmerk** dat de aanvoermodule een aanvoerkop omvat, welke aanvoerkop zodanig is uitgevoerd dat deze zich naar ten minste één persmodule uitstrekt.

7. Modulair systeem volgens één van de voorgaande conclusies, **met het kenmerk** dat elke persmodule is voorzien van een behuizing waarvan de overliggende zijden zijn voorzien van afsluitbare doorvoeropeningen.

8. Modulair systeem volgens één van de conclusies 2 tot en met 7, **met het kenmerk** dat de afvoermodule een reinigings- en afvoerkop omvat, welke reinigings- en afvoerkop zodanig is uitgevoerd dat deze zich naar ten minste één persmodule uitstrekt.

9. Modulair systeem volgens één van de voorgaande conclusies, **met het kenmerk** dat het systeem ten minste twee persmodules omvat.

10. Modulair systeem volgens conclusie 9, **met het kenmerk** dat de persmodules zijn voorzien van samenwerkende geleidedelen.

11. Modulair systeem volgens één van de conclusies 3 tot en met 10, **met het kenmerk** dat de toevoermodule in de afvoermodule is geïntegreerd.

12. Modulair systeem volgens één van de voorgaande conclusies, **met het kenmerk** dat, voor zover aanwezig, de persmodule(s), de bedieningsmodule, de aanvoermodule en de afvoermodule een identieke breedte hebben.

13. Modulair systeem volgens één van de voorgaande conclusies, **met het kenmerk** dat, voor zover aanwezig, de persmodule(s), de aanvoermodule, de afvoermodule, de toevoermodule, de FOUP-aanvoer- en de FOUP-afvoermodule ten minste gedeeltelijk door de bedieningsmodule worden bestuurd.

14. Modulair systeem volgens één van de voorgaande conclusies, **met het kenmerk** dat de op de persmodule aangebrachte koppelingen een integraal deel van de persstructuur uitmaken.

15. Modulair systeem volgens één van de voorgaande conclusies, **met het kenmerk** dat de koppelingen mannelijke en vrouwelijke koppelelementen omvatten.

16. Modulair systeem volgens één van de voorgaande conclusies, **met het kenmerk** dat een persmodule aan overliggende zijden van de module twee koppelingen omvat, welke twee koppelingen horizontaal zijn.

17. Modulair systeem volgens conclusie 16, **met het kenmerk** dat alle koppelingen van de systeemmodules in één horizontaal vlak zijn gelegen.

18. Verzameling van onderdelen voor het samenstellen van het modulaire systeem volgens één van de voorgaande conclusies, omvattende:

- ten minste één persmodule voor het omhullen van de elektronische componenten;
- ten minste één aanvoermodule voor het laden van de te omhullen elektronische componenten vanuit een cassette naar een persmodule;
- een bedieningsmodule met inbegrip van een intelligent elektronisch besturingssysteem die is uitgevoerd om ten minste gedeeltelijk elk van de andere systeemmodules te besturen,

waarbij de systeemmodules zijn voorzien van samenwerkende koppelingen voor onderlinge oriëntatie en bevestiging van aangrenzende systeemmodules.

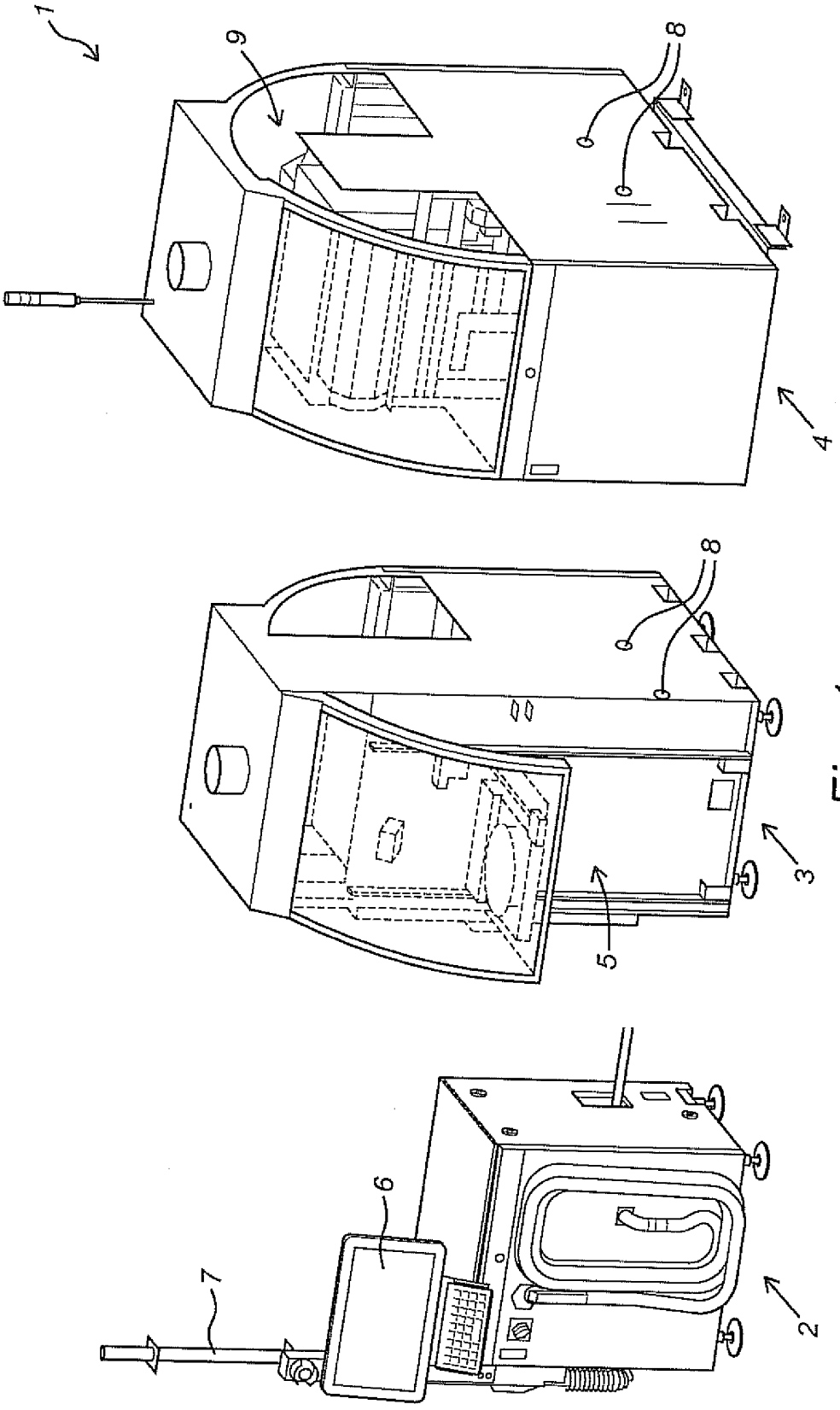

Fig. 1

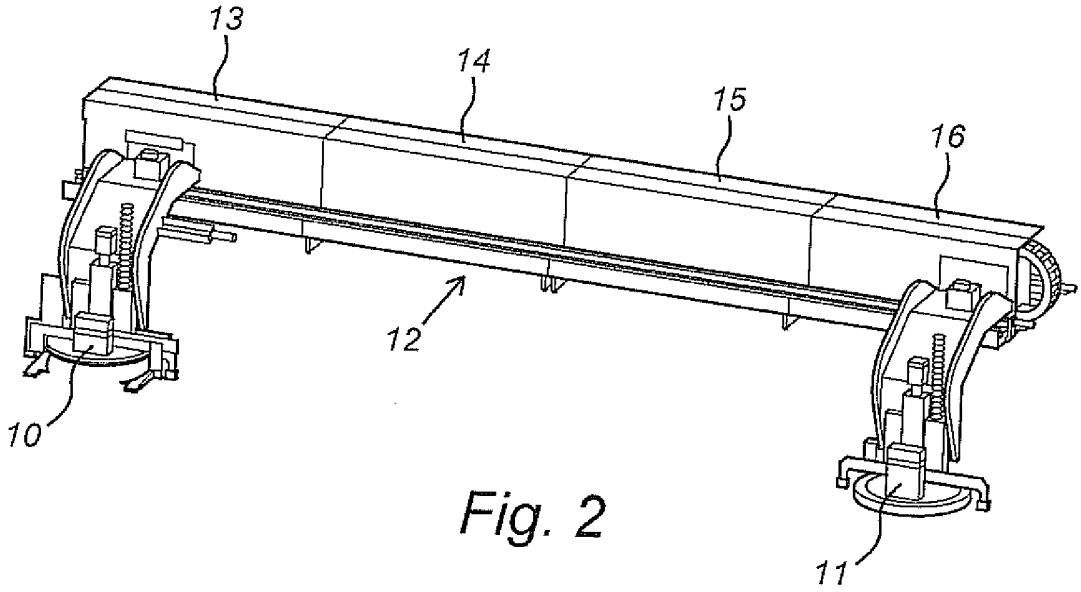

Fig. 2

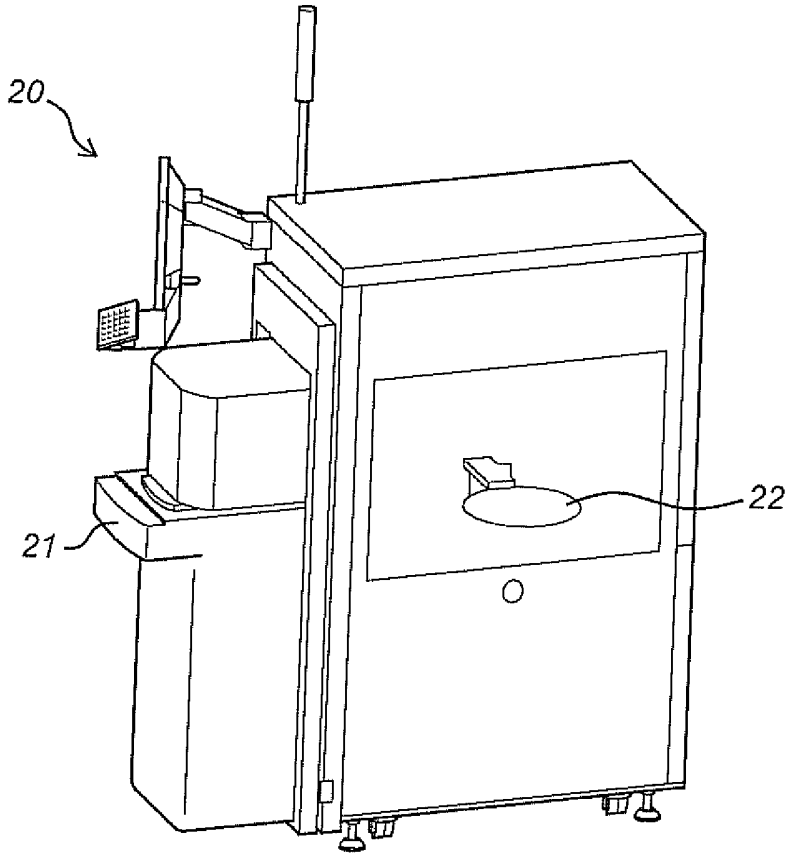

Fig. 3

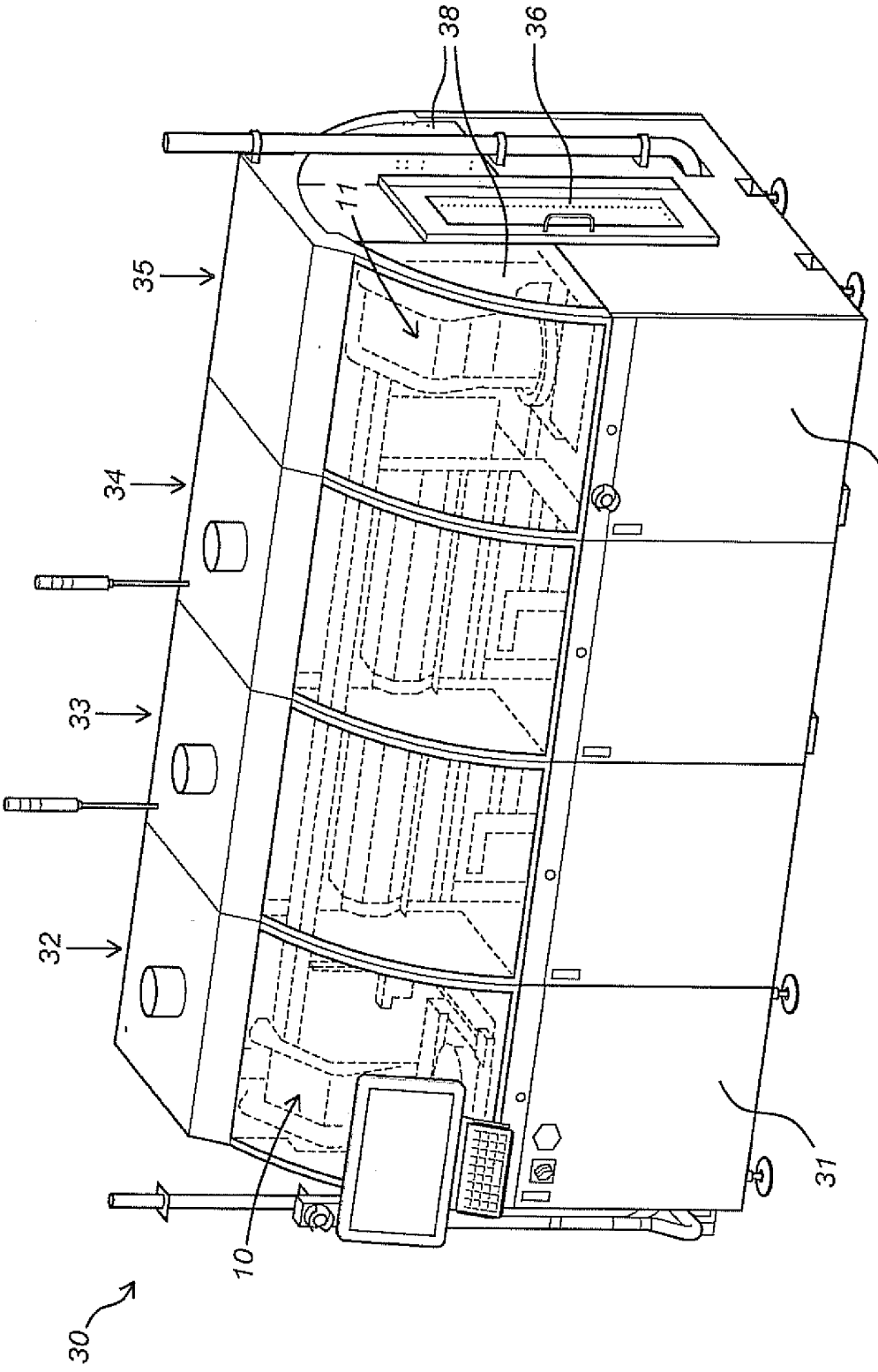

Fig. 4

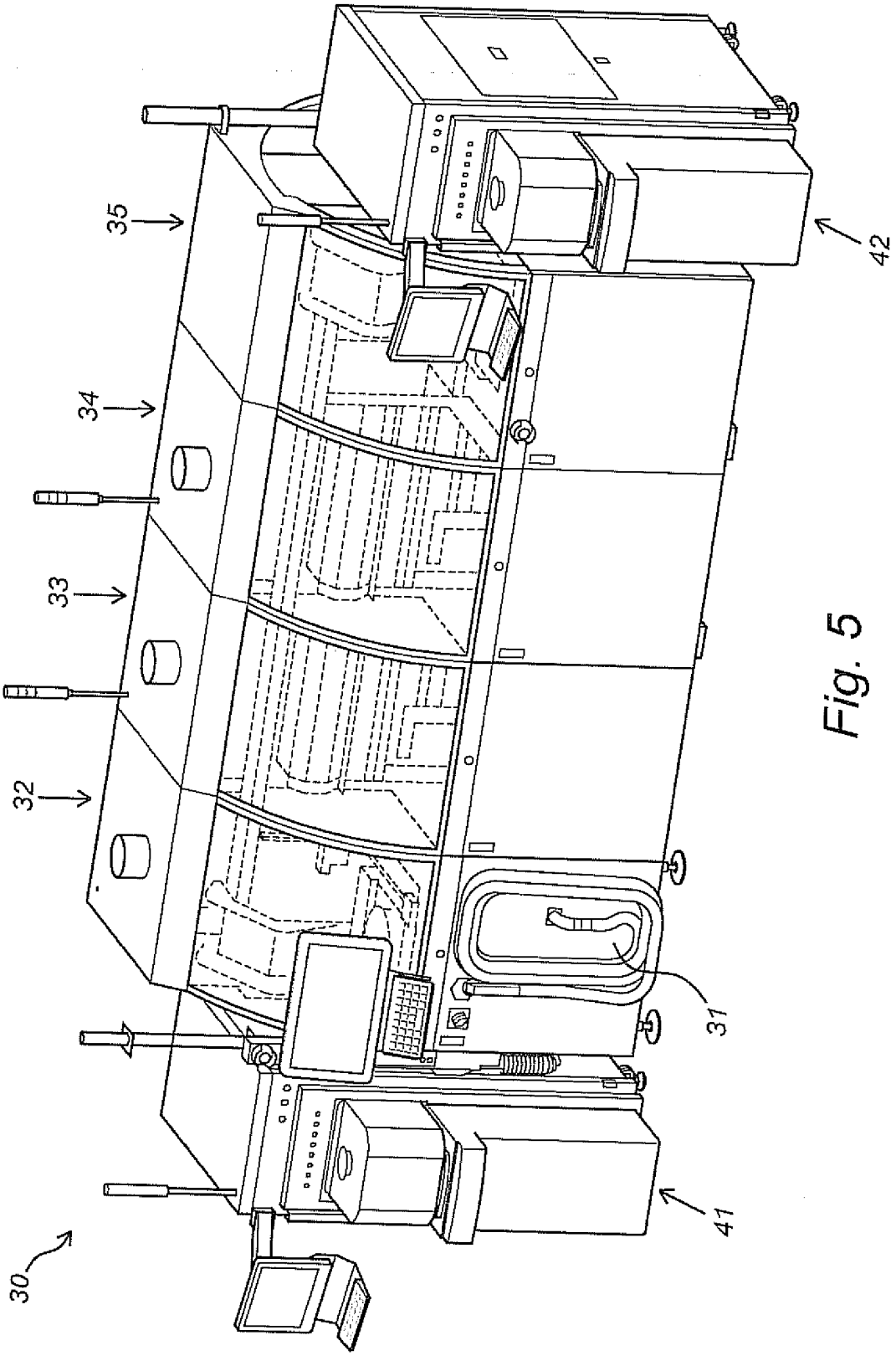

Fig. 5

Abstract

The invention relates to a **m**odular system for moulding electronic components, comprising at least three separate system modules; a press module for moulding the electronic components; a loader module for loading the electronic components to be moulded from a cassette to a press module; and a service module configured to at least partially control each of the other system modules. The invention also relates to a kit-of-parts for assembling such a modular system.

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE
	1.002.149 NL
Nederlands aanvraag nr. **2014802**	Indieningsdatum **13-05-2015**
	Ingeroepen voorrangsdatum
Aanvrager (Naam) **BESI NETHERLANDS B.V.**	
Datum van het verzoek voor een onderzoek van internationaal type **25-07-2015**	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. **SN64613**

I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)

Volgens de internationale classificatie (IPC)

H01L21/67

II. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimumdocumentatie

Classificatiesysteem	Classificatiesymbolen
IPC	**H01L**

Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

III. ☐ GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES (opmerkingen op aanvullingsblad)

IV. ☐ GEBREK AAN EENHEID VAN UITVINDING (opmerkingen op aanvullingsblad)

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Nummer van het verzoek om een onderzoek naar de stand van de techniek:
NL 2014802

A. CLASSIFICATIE VAN HET ONDERWERP
INV. H01L21/67
ADD.

Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC

B. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimum documentatie (classificatie gevolgd door classificatiesymbolen)
H01L

Onderzochte andere documentatie dan de minimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)
EPO-Internal, WPI Data

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie *	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
Y	US 6 178 361 B1 (GEORGE GREGORY [US] ET AL) 23 januari 2001 (2001-01-23) * kolom 8, regel 2 - regel 7; figuren 1,7,8 * * kolom 8, regel 34 - regel 40 * * kolom 9, regel 1 - kolom 11, regel 9 *	1-18
Y	US 2011/195140 A1 (HO SHU CHUEN [SG] ET AL) 11 augustus 2011 (2011-08-11) * alinea [0020]; figuur 1 *	1-18
A	EP 0 713 246 A1 (FICO BV [NL]) 22 mei 1996 (1996-05-22) * samenvatting; figuur 1 *	1

☐ Verdere documenten worden vermeld in het vervolg van vak C.

☒ Leden van dezelfde octrooifamilie zijn vermeld in een bijlage

* Speciale categorieën van aangehaalde documenten

"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

"D" in de octrooiaanvraag vermeld

"E" eerdere octrooi(aanvraag), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven

"L" om andere redenen vermelde literatuur

"O" niet-schriftelijke stand van de techniek

"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur

"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvraag, maar wordt vermeld ter verhelderiing van de theorie of het principe dat ten grondslag ligt aan de uitvinding

"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur

"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht

"&" lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid	Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type
28 januari 2016	

Naam en adres van de instantie	De bevoegde ambtenaar
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Oberle, Thierry

Formulier PCT/ISA/201 (tweede blad) (januari 2004)

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar de stand van de techniek: NL 2014802

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
US 6178361	B1 23-01-2001	GEEN	
US 2011195140	A1 11-08-2011	CN 102148171 A	10-08-2011
		KR 20110091468 A	11-08-2011
		MY 152438 A	30-09-2014
		SG 173304 A1	29-08-2011
		TW 201140708 A	16-11-2011
		US 2011195140 A1	11-08-2011
EP 0713246	A1 22-05-1996	CN 1134869 A	06-11-1996
		DE 69512498 D1	04-11-1999
		DE 69512498 T2	18-05-2000
		EP 0713246 A1	22-05-1996
		JP 3773570 B2	10-05-2006
		JP H08224753 A	03-09-1996
		MY 123669 A	31-05-2006
		NL 9401930 A	01-07-1996
		TW 290485 B	11-11-1996
		US 5654017 A	05-08-1997

WRITTEN OPINION

File No.	Filing date (day/month/year)	Priority date (day/month/year)	Application No.
SN64613	13.05.2015		NL2014802

International Patent Classification (IPC)
INV. H01L21/67

Applicant
Besi Netherlands B.V.

This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the application
- ☐ Box No. VIII Certain observations on the application

Examiner
Oberle, Thierry

Application number

WRITTEN OPINION

NL2014802

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ on paper

   ☐ in electronic form

   c. time of filing/furnishing:

   ☐ contained in the application as filed.

   ☐ filed together with the application in electronic form.

   ☐ furnished subsequently for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes:	Claims	1-18
	No:	Claims	
Inventive step	Yes:	Claims	
	No:	Claims	1-18
Industrial applicability	Yes:	Claims	1-18
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

D1 US 6 178 361 B1 (GEORGE GREGORY [US] ET AL) 23 januari 2001 (2001-01-23)

D2 US 2011/195140 A1 (HO SHU CHUEN [SG] ET AL) 11 augustus 2011 (2011-08-11)

2. The present application does not meet the criteria of patentability, because the subject-matter of claim 1 does not involve an inventive step.

3. INDEPENDENT CLAIM 1

3.1 D1 is regarded as being the prior art closest to the subject-matter of claim 1, and discloses (see figures 1, 7 and 8):

"Modulair systeem voor elektronische componenten (wafers in D1), omvattende ten minste drie afzonderlijke systeemmodules (1,2,5), waarbij de systeemmodules omvatten:
- ten minste één verwerkingsmodule (2);
- ten minste één aanvoermodule (5) voor het laden van de elektronische componenten vanuit een cassette (6) naar een verwerkingsmodule (2); en
- een bedieningsmodule (1) voorzien van een intelligent elektronisch besturingssysteem (39, see column 8 lines 2-7) dat is uitgevoerd om ten minste gedeeltelijk elk van de andere systeemmodules (2,5) aan te sturen;waarbij de systeemmodules(1,2,5) zijn voorzien van samenwerkende koppelingen (see figures 7 and 8, see as well column 8 lines 34-40; column 9 line 1 to column 11 line 9) voor onderlinge oriëntatie en bevestiging van aangrenzende systeemmodules."

3.2 The subject-matter of claim 1 therefore differs from this known system in that: the processing module is a press module for moulding the electronic components; the subject-matter of claim 1 is therefore new.

3.3 The problem to be solved by the present invention may therefore be regarded as how to modify the system of D1 in order to proceed to a moulding process on the electronic components.

3.4 D1 is silent about the exact nature of the process achieved in the different modules 2. Starting with D1 and faced to the problem to be solved, it would then be straightforward to install moulding presses as the processing modules 2. Modular moulding presses can be easily installed in a modular system as it shown for example in D2 (see modular moulding presses 43 in figure 1 as well as paragraph 20). Thus, there would be no technical obstacles to install moulding presses in the modular system known from D1 in order to solve the problem posed.

Therefore, the solution proposed in claim 1 of the present application cannot be considered as involving an inventive step.

4. DEPENDENT CLAIMS 2-18

Dependent claims 2-18 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of inventive step:

- the additional features of claims 2, 4, 5, 6, 11, 13 and 18 are known from D1 (see figures 1, 2 and 8);

- the additional features of claims 3, 9, 10, 14 are known from D2 (see figure 1);

- claims 7, 8, 12, 15, 16 and 17: the additional features of those claims refer to conventional features (such as openings in the modules, specification of dimensions, nature, type or orientation of couplings) very well known to the skilled person. The inclusion of such features in a known system cannot be seen as involving an inventive activity.