invention of at least a section of the base part, it is possible to create a miniaturized spring contact pin which requires only a few or no assembly steps for the components at all. The base part preferably forms the basic structure of the spring contact pin, wherein it is made at least to some extent of plastic. In order to be able to provide the contact to be executed with the spring contact pin for electrically testing an electric test object, electric conductivity of the spring contact pin is required. Electric conductivity is created by the metallizing of at least the section of the base part that is made of plastic. Due to the use of plastic, even complex structures can be produced easily and cost-effectively. After the metallizing of the plastic, complex electrically conducting structures are created which cannot at all be produced in accordance with conventional manufacturing techniques or only at extremely high costs and also not as the miniaturization made possible by the invention. Good electric and mechanical properties of the spring contact pin are achieved with metallizing. The plastic part, particularly the plastic base part allows for the realization of very delicate structures which, however, have no sufficient electric or mechanical properties, but these properties are provided in sufficient, even good quality by metallizing.

According to an aspect of the invention, there is provided a method for manufacturing a spring contact pin assembly having at least one spring contact pin, for establishing physical electrical contact, the method comprising the following steps: manufacturing at least one base piece of the spring contact pin, wherein at least a part of the base piece is made of plastic, and subsequently metallising at least the part of the base piece that is made of plastic, characterised in that manufacturing the at least one part of the base piece that is made of plastic is carried out by means of an additive production process, and in that the at least one spring contact pin is additively built on an electrical contact surface of a connection piece configured as a circuit carrier, in particular as a circuit board.

According to a development of the invention, the at least one section of the base part which is made of plastic is produced by means of an additive manufacturing process. “Additive manufacturing process,” which is also called “generative manufacturing process,” refers to a particularly quick and cost-effective manufacture which is executed directly on the basis of computer-internal data models from a shapeless (for example liquids, powders or the like) or a shape-neutral (for example, ribbon-like, wire-shaped, etc.) material by means of chemical and/or physical processes. Even though these are forming processes, no special tools, in which the corresponding geometry of the workpiece is stored (for example, molds), are required for a concrete result.

Preferably, a two-photon laser lithography, particularly a dip-in laser lithography method (DILL technology) is used as additive manufacturing process. Preferably, a liquid, particularly paste-like material is used and solidified by means of a laser. The material is preferably structured layer by layer, and so the section made of plastic is thus manufactured. This additive manufacturing process allows for extremely great design flexibility for different geometries, and so very complex plastic structures can be realized. With DILL technology, structures in the submicrometer range can be produced; as a result, spring contact pins according to the invention for a contact spacing of 0.3 mm or even smaller can be produced. Due to the technology according to the invention, the production of test cards with grids below 80 μm is also possible. For this technology, no special tools for the construction of the

Claims

1. A method for manufacturing a spring contact pin assembly having at least one spring contact pin, for establishing physical electrical contact, the method comprising the following steps:

- manufacturing at least one base piece of the spring contact pin, wherein at least a part of the base piece is made of plastic, and

- subsequently metallising at least the part of the base piece that is made of plastic, characterised in that

- manufacturing the at least one part of the base piece that is made of plastic is carried out by means of an additive production process, and in that

- the at least one spring contact pin is additively built on an electrical contact surface of a connection piece configured as a circuit carrier, in particular as a circuit board.

2. The method according to claim 1, characterised in that a two-photon laser lithography, in particular a dip-in laser lithography process is utilised as the additive production process.

3. The method according to any one of the preceding claims, characterised in that the metallisation is carried out in at least one galvanic and/or chemical process.

4. The method according to any one of the preceding claims, characterised in that the whole base piece is made of plastic, preferably by means of the additive production process, in particular as a one-piece base piece.

5. The method according to any one of the preceding claims, characterised in that the whole base piece is metallised.

6. The method according to any one of the preceding claims, characterised in that before the galvanic metallisation, an electrically conductive starter layer is applied at least to the part of the base piece that is made of plastic, or is produced on the surface of the part.

7. The method according to any one of the preceding claims, characterised in that, before metallisation, a seed layer is applied at least to the part of the base piece that is made of plastic, in particular by the dipping or plasma process, or is produced on the surface of the part.

8. The method according to any one of the preceding claims, characterised in that after metallisation the part made of plastic is not removed or at least certain regions are removed, particularly removed by a pyrolysis process, a wet chemical process and/or a dry chemical process.

9. The method according to any one of the preceding claims, characterised in that at least one aperture is produced or left in a metal coating produced by the metallisation, the aperture serving for the venting of pyrolysis products and/or allowing the entry of at least one wet and/or dry chemical agent during execution of the wet chemical and/or dry chemical process.

10. The method according to any one of the preceding claims, characterised in that for the spring function of the spring contact pin at least one region of the spring contact pin is configured in a spring-elastic manner due to its inherent elasticity and/or the shaping of its material.

11. The method according to any one of the preceding claims, characterised in that the spring-elastic region is formed as one piece with the remaining portion of the spring contact pin.

12. The method according to any one of the preceding claims, characterised in that the spring-elastic region is manufactured by forming at least one pressure, tension, bending and/or torsion spring and/or as a resilient area according to the buckling-wire principle.

13. The method according to any one of the preceding claims, characterised in that at least one head for physical contacting is formed on the end of the spring contact pin, the head preferably featuring at least one sharp tip and/or sharp edge for physical contacting.

14. The method according to any one of the preceding claims, characterised in that a plurality of spring contact pins are produced in a manner connected by the at least one connecting piece, in particular in a two or three-dimensional grid.

15. The method according to any one of the preceding claims, characterised in that the connecting piece is produced or co-produced by the additive production process.

16. The method according to any one of the preceding claims, characterised in that the electric contact surface is also metallised.

17. The method according to any one of the preceding claims, characterised in that a metallisation present between at least two spring contact pins is removed, particularly by laser, focusing ion beam and/or masking as well as by etching (lift-off), to electrically isolate the two spring contact pins from each another.

18. The method according to any one of the preceding claims, characterised in that a pedestal component made of electrically conductive material, preferably of metal, is produced on/attached to the contact surface of the connecting piece, and that the spring contact pin is produced on the pedestal component, wherein the metallisation is performed up to an area of the pedestal component adjacent to the base piece, but is not extended to the contact surface.

19. The method according to any one of the preceding claims, characterised in that the pedestal component is manufactured in the additive production process, in particular by sintering, preferably laser sintering, of powder materials.

20. The method according to any one of the preceding claims, characterised in that the manufacturing of the pedestal component is carried out on the contact surface and in particular in a manner establishing an electrical contact therewith.

21. The method according to any one of the preceding claims, characterised in that the pedestal component is manufactured with at least one spring-elastic structure, in particular a spring-elastic area of the particularly one-piece pedestal component, in such a manner that the spring effect acts in the direction of the physical contacting.