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, the present disclosure refers to a method for producing at least one spring contact pin acting as an electrical contact, or a spring contact pin arrangement comprising at least one such spring contact pin, with the following steps: producing at least one base part of the spring contact pin, wherein at least a section of said base part is made of plastic, and subsequent metallizing of at least the section of the base part that is made of plastic, wherein the at least one section of the base part that is made of plastic is produced by means of an additive manufacturing process, characterized in that the at least one spring contact pin is additively built on an electric contact surface of a connecting part which is designed as an electric circuit carrier.

According to an example, 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. Method for producing at least one spring contact pin acting as an electrical contact, or a spring contact pin arrangement comprising at least one such spring contact pin, with the following steps:
   - Producing at least one base part of the spring contact pin, wherein at least a section of said base part is made of plastic, and
   - subsequent metallizing of at least the section of the base part that is made of plastic,
   - wherein the at least one section of the base part that is made of plastic is produced by means of an additive manufacturing process, characterized in that
   - the at least one spring contact pin is additively built on an electric contact surface of a connecting part which is designed as an electric circuit carrier.

2. Method according to claim 1, characterized in that a two-photon laser lithography is used as additive manufacturing process.

3. Method according to claim 1, characterized in that the metallizing takes place in at least one galvanic or chemical process.

4. Method according to claim 1, characterized in that the entire base part is made of plastic.

5. Method according to claim 1, characterized in that the entire base part is metallized.

6. Method according to claim 3, characterized in that prior to the galvanic metallizing, an electrically conducting starting layer is applied at least to the section of the base part that is made of plastic, or is produced on the surface of the section.

7. Method according to claim 1, characterized in that prior to metallizing, a seed layer is applied at least to the section of the base part that is made of plastic, or is produced on the surface of the section.

8. Method according to claim 1, characterized in that after metallizing, the section made of plastic is not removed or at least areas thereof are removed.

9. Method according to claim 3, characterized in that at least one opening is created or left in the metal sleeve formed by metallizing, said opening being used for pyrolysis products to escape or for providing access of at least one wet chemical or dry chemical agent for executing the wet chemical or dry chemical process.

10. Method according to claim 1, characterized in that for the spring function of the spring contact pin, at least one area of the spring contact pin is an elastic area designed elastically resilient due to inherent elasticity and the design of its material.

11. Method according to claim 10, characterized in that the elastic area is integral with the remaining section of the spring contact pin.

12. Method according to claim 10, characterized in that the elastic area is produced by forming at least one pressure, tension, bending or torsion spring or as a resilient area according to the buckling-wire principle.

13. Method according to claim 1, characterized in that at least one head for contacting is formed on the end of the spring contact pin.

14. Method according to claim 1, characterized in that a plurality of spring contact pins are produced connectedly by means of the at least one connecting part.

15. Method according to claim 1, characterized in that the connecting part is produced or jointly produced by means of the additive manufacturing process.

16. Method according to claim 1, characterized in that the electric contact surface is also metallized.

17. Method according to claim 14, characterized in that a metallizing present between at least two spring contact pins for an electric insulation of the two spring contact pins to one another is removed.

18. Method according to claim 1, characterized in that a pedestal component made of electrically conducting material is produced on/attached to the contact surface of the connecting part, and that the spring contact pin is produced on the pedestal component, wherein metallizing is extended to an area of the pedestal component adjacent to the base part but is not extended to the contact surface.

19. Method according to claim 18, characterized in that the pedestal component is produced by means of the additive manufacturing process.

20. Method according to claim 18, characterized in that the pedestal component is produced on the contact surface and electrically connective with said contact surface.

21. Method according to claim 18, characterized in that the pedestal component is produced with at least one elastic structure, such that the spring effect acts in the direction of the contact.

22. Spring contact pin or spring contact pin arrangement having at least one spring contact pin, each produced using the method according to one of the claims 1 to 21.