

Cabling interface for a production machine in the plastics processing industry and method for retooling such a production machine

Technical field

[0001] The invention relates to a cabling interface for a production machine in the plastics processing industry and a method for retooling such a production machine according to the preamble of the independent claims.

Prior art

[0002] Patent specification CH692891A5 describes a known cabling interface for a production machine in the plastics processing industry. In the production machine, a relatively large number of workpieces are produced simultaneously and with high precision in a tool with a multi-cavity injection mould. In order to keep the reject rate to a defined level, mass production processes are monitored by a plurality of piezoelectric pressure transducers. A piezoelectric pressure transducer is arranged in each cavity of the multi-cavity injection mould. The piezoelectric pressure transducer dynamically captures a progression of a pressure in the cavity in the interior of a tool and returns a highly sensitive electrical charge signal for each internal tool pressure captured. The progression of the internal tool pressure is captured in a range from 0 to 2000 bar. A sensitivity of the pressure detection is in the range from 1 to 100pC/bar. A frequency of the dynamic detection of the

pressure progression is in the range of a few kHz. An operating temperature is in the range from 0 °C to 200 °C. The electrical charge signals are conducted away via cables to an electrical amplifier.

[0003] However, the tool with the multi-cavity injection mould is of complex construction and a length of the cable inside the tool is therefore cable-specific. In order to be able to route the cables inside the tool simply, cables that are not electromagnetically shielded are used, and these can be cut to length on site. The electrical charge signals also do not need to be shielded by separate means from electromagnetic and electrical interference because this is assured by a housing of the tools. The unshielded cables are thus inner cables. For this reason, the tool is equipped with the cabling interface, to accommodate the inner cables individually on an inner side of the tool and to transfer the electrical charge signals of each installed inner cable to an electromagnetically shielded outer cable on an outer side of the tool. The outer cable conducts the electrical charge signals away to the electrical amplifier.

[0004] There is a general desire to adapt such a cabling interface for a production machine in the plastics processing industry flexibly to technical research and industrial needs.

[0005] For example, patent specification WO2007/016799A1 describes a further known cabling interface for a production machine in the plastics processing industry. In the production machine, multiple measurement signals of different types are conducted away via multiple inner cables. The

cabling interface includes a signal converter and an output interface. The signal converter converts the measurement signals of different types into measurement signals of the same type. The measurement signals of different types are electrical charge signals from piezoelectric pressure transducers and electrical thermo-electric voltages from thermocouples. The output interface conducts the measurement signals of the same type away to an evaluation unit located outside the production machine via a single outer cable. The outer cable is electromagnetically shielded. The outer cable is connected to the output interface in such manner that it can be electrical and mechanically disconnected.

[0006] A known cabling interface of such kind for a production machine in the plastics processing industry is marketed commercially with type designation 1710B... by the Kistler Group, details are provided in a datasheet 960-112d-02.15. At least one piezoelectric pressure transducer per cavity conducts electrical charge signals away to the cabling interface via an inner cable. Up to eight inner cables can be connected electrically to a tool inner side of the cabling interface. The electrical charge signals are transferred from the tool inner side to a tool outer side. An outer cable that is connected to the tool outer side so as to be electrically and mechanically detachable conducts the electrical charge signals away to an evaluation unit. The outer cable is electromagnetically shielded.

[0007] A very similar known cabling interface for a production machine in the plastics processing industry is marketed commercially with type designations PZ-4 and PZ-8 by

RJG Inc.. The external dimensions for installation in production machines of types 1710B... from the Kistler Group and the PZ-4 and PZ-8 from RJG Inc. are largely identical.

[0008] The object of the present invention is to adapt a known cabling interface for a production machine of the plastics processing industry flexibly to technical needs in re-search and industry.

Summary of the invention

[0009] This object is solved with the features of the independent claim.

[0010] The invention relates to a cabling interface for a production machine in the plastics processing industry, which production machine includes multiple cavities and multiple piezoelectric pressure transducers; wherein at least one piezoelectric pressure transducer is arranged at each cavity, and said piezoelectric pressure transducer captures an internal tool pressure inside the cavity and returns an electrical charge signal for each internal tool pressure detected and conducts it away to the cabling interface via an inner cable; and wherein the inner cables can be connected electrically to the cabling interface via at least two different connection standards.

[0011] In this way, electrical charge signals can be conducted away to an evaluation unit via the cabling interface even if the inner cables of the piezoelectric pressure transducers that return the electrical charge

signals have different connection standards. This enables flexible maintenance of the production machine. If an installed piezoelectric pressure transducer is removed, it can be replaced with any piezo-electric pressure transducer that is currently available, even if the new transducer has a different connection standard, thereby saving costs and time. There is also no longer any necessity to use piezoelectric pressure transducers with specific connection standards. Accordingly, piezoelectric pressure transducers with the best price-performance ratio can be used.

[0012] The invention also relates to a method for retooling a production machine of the plastics processing industry, which production machine includes multiple cavities and multiple piezoelectric pressure transducers; wherein at least one piezoelectric pressure transducer is arranged at each cavity, and said piezoelectric pressure transducer captures an internal tool pressure inside the cavity and returns an electrical charge signal for each internal tool pressure detected and conducts it away to the cabling interface via an inner cable; wherein a cabling interface is provided that may be connected electrically to the inner cables via at least two different connection standards; wherein the existing cabling interface is removed from the production machine; and wherein the cabling interface is installed in the production machine.

[0013] In this way, an existing cabling interface is replaced with a cabling interface having multiple different connection standards. This enables flexible retrofitting of the production machine. Installed piezoelectric pressure

transducers in which the inner cables having a given connection standard may be connected electrically to a new evaluation unit via the cabling interface. In this way, a production machine may be retrofitted with a new evaluation unit offering the best price-performance ratio.

Brief description of the drawing

[0014] In the following section, the invention will be explained in greater detail using the figures of the drawing. In the drawing:

Fig. 1 is a schematic representation of a production machine of the plastics processing industry with a cabling interface according to the invention;

Fig. 2 is a flowchart of the steps in a method for retooling a production machine of the plastics processing industry;

Fig. 3 is a perspective view of a first embodiment of a cabling interface according to the invention with two different connection standards;

Fig. 4 is a plan view of the first embodiment of a cabling interface according to Fig. 3;

Fig. 5 is a perspective view of a second embodiment of a cabling interface according to the invention with two different connection standards;

- Fig. 6 is a plan view of the second embodiment of a cabling interface according to Fig. 5;
- Fig. 7 is a perspective view of a third embodiment of a cabling interface according to the invention with three different connection standards;
- Fig. 8 is a plan view of the third embodiment of a cabling interface according to Fig. 7;
- Fig. 9 is a perspective view of a fourth embodiment of a cabling interface according to the invention with three different connection standards;
- Fig. 10 is a plan view of the fourth embodiment of a cabling interface according to Fig. 9;
- Fig. 11 is a perspective view of a fifth embodiment of a cabling interface according to the invention with three different connection standards;
- Fig. 12 is a plan view of the fifth embodiment of a cabling interface according to Fig. 11;
- Fig. 13 is a perspective view of a sixth embodiment of a cabling interface according to the invention with three different connection standards;
- Fig. 14 is a plan view of the sixth embodiment of a cabling interface according to Fig. 13.

Ways of implementing the invention

[0015] Fig. 1 shows a production machine 1 of the plastics processing Industry having a cabling interface 10 according to the invention and an evaluation unit 20. Fig. 2 shows a flowchart with steps c), d), e) of a method for retooling a production machine of the plastics processing Industry. Figs 3 to 14 show several embodiments of the cabling interface 10. In the embodiments according to Figs 3 to 6, cabling interface 10 is designed for two different connection standards A, B, in the embodiments of Figs 7 to 14, cabling interface 10 is designed for three different connection standards A, B, C, D.

[0016] Production machine 1 of the plastics processing industry according to Fig. 1 includes a tool with a multi-cavity injection mould with multiple cavities 11, 11', 11'' and a runner 12. A piezoelectric pressure transducer 13, 13', 13'' is arranged at each cavity 11, 11', 11''. The crystallographic orientation of piezoelectric pressure transducers 13, 13', 13'' is such that a pressure acting on them produces electrical polarisation charges. The electrical polarisation charges are proportional to the magnitude of the internal tool pressure prevailing inside the respective cavity 11, 11', 11'' and are tapped via electrodes. Piezoelectric pressure transducers 13, 13', 13'' dynamically capture a progression of the internal tool pressure in cavities 11, 11', 11''. Each piezoelectric pressure transducer 13, 13', 13'' conducts an electrical charge signal for a captured internal tool pressure in a cavity 11, 11', 11'' away to cabling interface 10 via an inner cable 14, 14',

14''. Piezoelectric pressure transducers 13, 13', 13'' are constructed integrally with inner cables 14, 14', 14''. With the knowledge presented in the present invention, the multi-cavity injection mould may be constructed with more than the three cavities represented in Fig. 1, for example it may include as many as 50 cavities. Equally, more than three inner cables 14, 14', 14'' may also conduct electrical charge signals away to the cabling interface 10, in Figs 3 to 14 as many as four to eight inner cables 14 - 14'''''''' may conduct electrical charge signals away to cabling interface 10.

[0017] According to Fig. 1, inner cables 14, 14', 14'' are connected electrically to cabling interface 10 via inner sockets 15, 15', 15''. Inner cables 14, 14', 14'' have an electrical conductor for conducting the electrical charge signals. Inner cables 14, 14', 14'' may include means for shielding the electrical charge signals from electromagnetic and electrical interference. Such shielding may also be provided by a tool housing, which is not shown in the Figures. Inner sockets 15, 15', 15'' are arranged on a tool inner side of cabling interface 10. Inner cables 14, 14', 14'' and inner sockets 15, 15', 15'' are adapted to each other and have different connection standards A, B, C, D:

[0018] A first connection standard A relates to a detachable electrical connection of a coaxial cable to a coaxial socket in cabling interface 10. The coaxial cable and the coaxial socket shield the electrical charge signal electromagnetically. In order to create an electrical connection, the coaxial cable is plugged into the coaxial socket and engaged in place. Correct engagement is confirmed

audibly. The electrical connection between the coaxial cable and the coaxial socket is reversibly detachable. In Figs 3 to 14, the coaxial cable is represented by inner cable 14', 14'', 14'''''''' and the co-axial socket is represented by inner socket 15', 15'', 15'''''. Such a coaxial cable is available commercially with type designation 1943C from the Kistler Group, details are provided in datasheet 1631C-000-346d-12.13.

[0019] A second connection standard B relates to a detachable electrical connection of a pierce contact cable plug with a socket in cabling interface 10. The electrical charge signal is carried in a single-wire cable which is not shielded electromagnetically. The single-wire cable includes a sheath with electrical insulation. In order to be able to route the single-wire cable inside the tool easily it is cut to size on site and introduced into the pierce contact cable plug with an end thereof that has not been stripped. The pierce contact cable plug has a housing and pierce contacts. When the pierce contacts are actuated, the electrical insulation on the introduced cable end is pierced, and the cable end is connected mechanically and electrically to the housing. Actuation of the pierce contacts and/or the mechanical engagement of said pierce contacts is confirmed audibly. The electrical connection between the pierce contact cable plug and the socket is reversibly detachable. In Figs 3 to 14, the single-wire cable with pierce contact cable plug is represented by inner cable 14', 14''''', 14'''''' and the socket is represented by inner socket 15', 15''''', 15'''''''. Such a pierce contact cable plug is available commercially from Phoenix Contact in the product family PTPM 0,4/...-P.

[0020] A third connection standard C relates to an electrical connection between a single-wire cable and an insulation displacement contact socket in cabling interface 10. The electrical charge signal is carried in a single-wire cable which is not shielded electromagnetically. The single-wire cable includes a sheath with electrical insulation. For easy insertion in the tool, the single-wire cable is cut to size on site and introduced into the IDC socket with an end thereof that has not been stripped. An electrical connection is created in which the cable end that has been introduced is stripped by a specially shaped cutting blade and clamped with the IDC socket. The installation aid is removed. The electrical connection can only be reversibly detached a few times. In Figs 7, 8, 13 and 14, the single-wire cable is represented by inner cable 14', 14'', 14''' and the socket is represented by inner socket 15', 15'', 15'''. Such a single-wire cable is available commercially with type designations 1666A..., 1674AZsp and 1900A17... from the Kistler Group. Such a socket is available commercially with type designations 1712A0 and 1714A0 from the Kistler Group, details are provided in datasheet 960-112d-02.15.

[0021] A fourth connection standard D relates to a detachable electrical connection between an insulation displacement contact plug and a socket in cabling interface 10. The electrical charge signal is carried in a single-wire cable which is not shielded electromagnetically. The single-wire cable includes a sheath with electrical insulation. In order to be able to route the single-wire cable inside the tool easily, it is cut to size on site and introduced into the IDC cable plug with a cable end thereof that has not been

stripped. The IDC cable plug includes a housing with a crimping clamp. Upon actuation, the crimping clamp cuts through the electrical insulation of the inserted cable end and strips it off, the cable wire is also slightly nicked and connected mechanically and electrically with the housing. Actuation of the crimping clamp is confirmed audibly. The electrical connection between the insulation displacement contact cable plug and the socket is reversibly detachable. In Figs 9 to 12, the single-wire cable with IDC cable plug is represented by inner cable 14'' and the socket is represented by inner socket 15''. Such a IDC cable plug is available commercially in an item family CIOC-M from Phoenix Contact.

[0022] With the knowledge presented in the present invention, a person skilled in the art is able to use other connection standards not described in detail here.

[0023] Cabling interface 10 is designed for multiple electrical connections I - VIII with multiple inner cables 14 - 14'''''''''. Inner cables 14 - 14'''''''' form electrical connections I - VIII with cabling interface 10 via the inner sockets 15 - 15'''''''''. Inner sockets 15 - 15'''''''' are furnished with an electrical conductor to conduct the electrical charge signals away. At least two inner sockets 15 - 15'''''''' have different connection standards A, B, C, D for an electrical connection I - VIII. In the embodiments according to Figs 3, 4, 7 and 8, cabling interface 10 is designed for up to four electrical connections I - IV, wherein each electrical connection I - IV may be implemented in two different connection standards A, B. In the embodiments of Figs 9 and 10, it is designed for up to four

electrical connections I - IV, wherein each electrical connection I - IV may be implemented in three different connection standards A, B, D. In the embodiments of Figs 5, 6, 11 to 14, it is designed for up to eight electrical connections I - VIII, wherein each electrical connection I - VIII may be implemented in two different connection standards A, B, C, D. In Figs 4, 6, 8, 10, 12 and 14, the inner sockets 15 - 15'''''''' that are connected electrically to an inner cable 14 - 14'''''''' are shown in solid black. With the knowledge presented in the present invention, a person skilled in the art is also able to provide more than three inner sockets with different connection standards.

[0024] Accordingly, cabling interface 10 has a greater number of inner sockets 15 - 15'''''''''' than the number of electrical connections I - VIII for which it is designed. In the embodiments of Figs 3, 4, 7 and 8, it has eight inner sockets 15 - 15''. In the embodiments of Figs 9 and 10, it has twelve inner sockets 15 - 15''. In the embodiments of Figs 5, 6, 11 to 14, it has sixteen inner sockets 15 - 15''''''''''.

[0025] Cabling interface 10 includes a number of indicators 18 - 18'''''''''''. Indicators 18 - 18'''''''''' are arranged on the tool inner side of cabling interface 10. Each indicator 18 - 18'''''''''' has a designator. One indicator 18 - 18'''''''''' is assigned to each inner socket 15 - 15'''''''''' , and the electrical connection I - VIII of an inner socket 15 - 15'''''''''' is identified by the designator of the indicator 18 - 18'''''''''' assigned to it. The connection standard A, B, C, D of an inner socket 15 -

15'''''''' is also identified by the designator of the indicator 18 - 18'''''''' assigned to the inner socket 15 - 15''''''''. In this way, the electrical connection I - VIII and the connection standard A, B, C, D of the inner sockets 15 - 15'''''''' are indicated unambiguously by means of indicators 18 - 18''''''''. The designator may be a label, a lamp or the like. In Figures 4, 6, 8, 10, 12 and 14, the designator is a label such as "A II" in Fig. 4 or "C VI" in Fig. 14. With the knowledge presented in the present invention, the designator may also be a lamp such as a light emitting diode (LED), which LED lights up in two different colours, in a first colour when an inner cable is mechanically and electrically connected to the inner socket to which the LED is assigned and in a second colour when an inner cable is not mechanically and electrically connected to the inner socket to which the LED is assigned. The colour control of the LED may be assured by a sensor that detects a pressure in an electrical connection between the inner cable and the inner socket, or it may be assured by a switch which switches when an electrical connection is made between an inner cable and an inner socket.

[0026] For example, in the embodiment of Figs 3 and 4, two inner sockets 15' are present with different connection standards A, B for an electrical connection II. An inner cable 14' is connected electrically to one inner socket 15' via the second connection standard B. Inner cable 14' is clearly connected mechanically and electrically to inner socket 15'. In Fig. 4, this is represented by a solid black inner socket 15' of connection standard B. This electrical connection II via connection standard B is marked

unmistakably with a designator having label "B II" of indicator 18. Indicator 18 of inner socket 15', with which inner cable 14' is electrically connected, thus showing that an electrical connection I has been made for this connection standard B, and how this electrical connection I is identified. And indicator 18 of the at least one other inner socket 15', which is not electrically connected to inner cable 14' shows that an electrical connection I has not been made for this connection standard A by the designator with label "A II". In this way, the clear visibility of inner cable 14' in inner socket 15' of electrical connection I avoids the risk that a further inner cable 14 - 14'''''''' might be connected electrically with the other inner socket 15 of electrical connection I via first connection standard A.

[0027] Maintenance of production machine 1 is made easier by the cabling interface 10 according to the invention in that a piezoelectric pressure transducer 13, 13', 13'' for replacement may be replaced with an available piezoelectric pressure transducer 13, 13', 13'' whose inner cable 14 - 14'''''''' has a different connection standard A, B, C, D than that of the inner cable 14 - 14'''''''' of the piezoelectric pressure transducer 13, 13', 13'' which is to be replaced. In a step a), the existing piezoelectric pressure transducer 13, 13', 13'' is removed from production machine 1, and in a step b) a new piezoelectric pressure transducer 13, 13', 13'' is installed in production machine 1, which transducer replaces the existing piezoelectric pressure transducer 13, 13', 13'' and has a although the inner cable 14 - 14'''''''' thereof has one of the different connection standards A, B, C, D of

cabling interface 10. In particular, in step b) electrical connection I - VIII is made between inner cable 14 - 14'''''''' of the new piezo-electric pressure transducer 13, 13', 13'' and one of at least two Inner sockets 15 - 15'''''''', which inner sockets 15 - 15'''''''' have different connection standards A, B, C, D for electrical connection I - VIII. Electrical connection I - VIII of inner cable 14 - 14'''''''' is made with one of the inner sockets 15 - 15'''''''', which inner socket 15 - 15'''''''' has the same connection standard A, B, C, D as inner cable 14 - 14''''''''.

[0028] Cabling interface 10 has an outer socket 16. Outer socket 16 is arranged on an outer side of the cabling interface 10 of a tool. Outer socket 16 includes electrical conductors for conducting the electrical charge signals away. A number of electrical conductors in outer socket 16 is at least equal to the number of electrical connections I - VIII of cabling interface 10. Accordingly, outer socket 16 has at least four to eight electrical conductors.

[0029] An electrically shielded outer cable 17 may be electrically connected to outer socket 16 in reversibly detachable manner. Outer cable 17 conducts the electrical charge signals away to evaluation unit 20. Such an outer socket 16 is marketed commercially with type designation 1710B... by the Kistler Group. Such an outer cable 17 is marketed commercially with type designations 1995A..., 1997A..., 1999A... by the Kistler Group. Such an evaluation unit 20 is marketed commercially with the name CoMo Injection System and type designation 2869B... by the Kistler Group, details are provided in a datasheet 2869B_000-549.

[0030] Cabling interface 10 is equipped with electrical conductors which connect the electrical conductors of inner sockets 15 - 15'''''''' electrically with the electrical conductors of outer socket 16. Electrical conductors of the inner sockets 15 - 15'''''''' that have different connection standards A, B, C, D for an electrical connection I - VIII are connected in parallel. These parallel connected electrical conductors of inner sockets 15 - 15'''''''' are connected electrically to an electrical conductor for said electrical connection I - VIII of outer socket 16. For example, in the embodiment of Figs 3 and 4, two inner sockets 15' with different connection standards A, B are present for an electrical connection II. The electrical conductors of these inner sockets 15' are connected in parallel on cabling interface 10 and connected electrically with an electrical conductor of outer socket 16 for electrical connection II.

[0031] Fig. 2 shows a flowchart with steps c), d), e) of a method for retooling production machine 1. Production machine 1 has an existing cabling interface 0. In a step c), a new inventive cabling interface 10 is provided, which is electrically connectable to inner cables 14 - 14'''''''' via at least two different connection standards A, B, C, D. In a step d), the existing cabling interface 0 is removed from production machine 1. In a step e), the new cabling interface 10 is installed in production machine 1. The newly installed cabling interface 10 is electrically connected to inner cables 14 - 14''''''''. In step e), an electrical connection I - VIII is made between an inner cable 14 - 14'''''''' and one of at least two inner sockets 15 - 15'''''''' on the installed cabling interface 10, which inner sockets 15 - 15'''''''' have

different connection standards A, B, C, D for the electrical connection I - VIII. Also in step e), indicator 18 - 18'''''' of the inner socket 15 - 15'''''' with which inner cable 14 - 14'''''' is electrically connected indicates that an electrical connection I - VIII has been made for this connection standard A, B, C, D and how this electrical connection I - VIII is identified. And indicator 18 - 18'''''' of the at least one other inner socket 15 - 15'''''' which is not electrically connected to inner cable 14 - 14'''''' shows that an electrical connection I - VIII has not been made for this connection standard A, B, C, D. Inner cables 14 - 14'''''' of piezoelectric pressure transducers 13, 13', 13'' are connectable to a new evaluation unit 20 via cabling interface 10.

[0032] With the knowledge disclosed by the present invention, a person skilled in the art is also able to use the cabling device in production machines outside of the plastics processing industry.

List of reference signs

a) - e)	Method steps
A, B, C, D	Connection standard
I - VIII	Electrical connection
1	Production machine
0	Existing cabling interface
10	Cabling interface
11, 11', 11''	Cavity
12, 12', 12''	Runner
13, 13', 13''	Piezoelectric pressure transducer
14 - 14''''''''	Inner cable
15 - 15''''''''	Inner socket
16	Outer socket
17	Outer cable
18 - 18''''''''	Indicator
20	Evaluation unit

CLAIMS

1. A cabling interface (10) for a production machine (1) in the plastics processing industry, which production machine (1) includes multiple cavities (11, 11', 11'') and multiple piezoelectric pressure transducers (13, 13', 13''); wherein:
 - at least one piezoelectric pressure transducer (13, 13', 13'') is arranged at each cavity (11, 11', 11''), which piezoelectric pressure transducer (13, 13', 13'') captures an internal tool pressure inside the cavity (11, 11', 11'') and returns an electrical charge signal for each internal tool pressure captured and conducts it away to the cabling interface (10) via an inner cable (14 - 14''''''');;
 - the inner cables (14 - 14''''''') are connected electrically to the cabling interface (10) via at least two different connection standards (A, B, C, D);
 - the cabling interface (10) includes multiple inner sockets (15 - 15'''''''); and the inner cables (14 - 14''''''') form electrical connections (I - VIII) with the cabling interface (10) via the inner sockets (15 - 15''''''');;
 - at least two inner sockets (15 - 15''''''') have different connection standards (A, B, C, D) for an electrical connection (I - VIII); and

- the cabling interface (10) has an outer socket (16) which has an electrical conductor for each electrical connection (I - VIII); each inner socket (15 - 15''''''') has an electrical conductor for each electrical connection (I - VIII); and the electrical conductors from those inner sockets (15 - 15''''''') that have different connection standards (A, B, C, D) for an electrical connection (I - VIII) are connected in parallel; and the parallel-connected electrical conductors of the inner sockets (15 - 15''''''') are connected electrically to an electrical conductor of the electrical connection (I - VIII) of the outer socket (16).
- 2. The cabling interface (10) according to claim 1, wherein it has a greater number of inner sockets (15 - 15''''''') than the number of electrical connections (I - VIII) for which it is designed.
- 3. The cabling interface (10) according to claim 1 or 2 wherein it has multiple indicators (18 - 18'''''''); and the electrical connection (I - VIII) of any inner socket (15 - 15''''''') is identified by an indicator (18 - 18''''''').
- 4. The cabling interface (10) according to claim 1 or 2 wherein it has multiple indicators (18 - 18'''''''); and the connection standard (A, B, C, D) of any inner socket (15 - 15''''''') is identified by an indicator (18 - 18''''''').

5. A method for maintaining a production machine (1) in the plastics processing industry having a cabling interface (10) according to claim 1 or 2, comprising the steps of:
 - a) removing an existing piezoelectric pressure transducer (13, 13', 13'') from the production machine (1); and
 - b) installing a new piezoelectric pressure transducer (13, 13', 13'') in the production machine (1), wherein the new piezoelectric pressure transducer replaces the existing piezoelectric pressure transducer (13, 13', 13''), and the inner cable (14 - 14''''''') of the new piezoelectric pressure transducer has one of the different connection standards (A, B, C, D) of the cabling interface (10).
6. The method according to claim 5, wherein in step b) the electrical connection (I - VIII) of the inner cable (14 - 14''''''') of the new piezoelectric pressure transducer (13, 13', 13'') is made with one of at least two inner sockets (15 - 15'''''''), which inner sockets (15 - 15''''''') have different connection standards (A, B, C, D) for the electrical connection (I - VIII); and the electrical connection (I - VIII) of the inner cable (14 - 14''''''') is made with that of the inner socket (15 - 15''''''') which inner socket (15 - 15''''''') has the same connection standard (A, B, C, D) as the inner cable (14 - 14''''''').

7. The method according to claim 6, wherein each inner socket (15 - 15''''''') has an indicator (18 - 18'''''''), which indicator (18 - 18''''''') identifies the electrical connection (I - VIII) and the connection standard (A, B, C, D) of the inner socket (15 - 15'''''''), and wherein in step b) the indicator (18 - 18''''''') of the inner socket (15 - 15''''''') with which the inner cable (14 - 14''''''') is electrically connected shows that an electrical connection (I - VIII) has been made for this connection standard (A, B, C, D), and how this electrical connection (I - VIII) is identified; and the indicator (18 - 18''''''') shows for at least one other inner socket (15 - 15''''''') that is not connected to the inner cable (14 - 14'''''''), that an electrical connection (I - VIII) has not been made for this connection standard (A, B, C, D).
8. A method for retooling a production machine (1) in the plastics processing industry, which production machine (1) has multiple cavities (11, 11', 11'') and multiple piezoelectric pressure transducers (13, 13', 13''); wherein at least one piezoelectric pressure transducer (13, 13', 13'') is arranged at each cavity (11, 11', 11''), which piezoelectric pressure transducer (13, 13', 13'') captures an internal tool pressure inside the cavity (11, 11', 11'') and returns an electrical charge signal for each internal tool pressure captured and conducts the electrical charge signal away to an existing cabling interface (0) via an inner cable (14 - 14'''''), comprising the steps of:

- c) providing a cabling interface (10) that is electrically connectable to the inner cables (14 - 14''''''') via at least two different connection standards (A, B, C, D);
 - d) removing the existing cabling interface (0) from the production machine (1); and
 - e) installing the cabling interface (10) in the production machine (1).
9. A method according to claim 8, wherein in step e) the installed cabling interface (10) is connected electrically to the inner cables (14 - 14''''''').
10. A method according to claim 9, wherein in step e) an electrical connection (I - VIII) of an inner cable (14 - 14''''''') is made with one of at least two inner sockets (15 - 15''''''') of the installed cabling interface (10), which inner sockets (15 - 15''''''') have different connection standards (A, B, C, D) for the electrical connection (I - VIII).
11. A method according to claim 10, wherein each inner socket (15 - 15''''''') has an indicator (18 - 18'''''''), which indicator (18 - 18''''''') identifies the electrical connection (I - VIII) and the connection standard (A, B, C, D) of the inner socket (15 - 15'''''''), and wherein in step e) the indicator (18 - 18''''''') of the inner socket (15 - 15''''''') with which the inner cable (14 - 14''''''') is electrically connected shows that an electrical connection (I - VIII) has been made for this connection standard (A, B, C, D),

and how this electrical connection (I - VIII) is identified; and the indicator (18 - 18''''''') of the at least one other inner socket (15 - 15''''''') that is not electrically connected to the inner cable (14 - 14''''''') shows that an electrical connection (I - VIII) has not been made for this connection standard (A, B, C, D).

12. A method according to any one of claims 8 to 11, wherein the inner cables (14 - 14''''''') of the piezoelectric pressure transducers (13, 13', 13'') are connected electrically with a new evaluation unit (20) via the cabling interface (10).

ABSTRACT

Cabling interface for a production machine in the plastics processing industry and method for retooling such a production machine

The invention relates to a cabling interface (10) for a production machine (1) in the plastics processing industry, which production machine (1) includes multiple cavities (11, 11', 11'') and multiple piezoelectric pressure transducers (13, 13', 13''); wherein at least one piezoelectric pressure transducer (13, 13', 13'') is arranged at each cavity (11, 11', 11''), which piezoelectric pressure transducer (13, 13', 13'') captures an internal tool pressure inside the cavity (11, 11', 11'') and returns an electrical charge signal for each internal tool pressure detected and conducts it away to the cabling interface (10) via an inner cable (14 - 14'''''''); and wherein the inner cables (14 - 14''''''') can be connected electrically to the cabling interface (10) via at least two different connection standards (A, B, C, D).

(Fig. 3)