

A SECURITY AND COMPLIANCE SYSTEM

Field of the Invention

5 The invention relates to the manufacture and operation of equipment comprising multiple interactive components requiring a high degree of compatibility.

One such application of equipment is for machinery used for the processing and manufacture of integrated circuits whereby the machinery comprises an assembly of
10 various parts, the operation of which require high levels of integration.

Background

The operation of highly complex equipment requires the component parts to both fit and
15 operate collectively in a manner that is both effective and safe.

For instance, for equipment used for the processing of integrated circuit units, the individual components of the machinery require a high level of interactivity to maintain productivity in safe operating conditions.

20

Further examples include equipment used for dicing substrates of integrated circuits into singulated IC units. Because the processing of the units can be at speeds of several meters per second, a misalignment of components or a lack of clear fit may disrupt

production or lead to damage to the equipment. More seriously, because high speed dicing saws are involved, this becomes a critical issue for the safety of the operator.

Maintaining the example of a dicing machine for integrated circuit units, a net table for receiving the integrated circuit units may require a kit for the safe receiving and holding of the units in place. The net table itself is an assembly which may travel at considerable speed during operation. If the net table is not accurately aligned through compatible components, the damage to the device may disrupt production requiring unscheduled maintenance and possible replacement of expensive equipment.

10

It would therefore be advantageous to have a system that ensures the compatibility of components during operations.

Summary of Invention

15

In a first aspect, the invention provides a device comprising a plurality of components, each having an assembly of inter-operable parts; a plurality of transponders in each of which is stored a unique identifier; each of said plurality of transponders corresponding to one of said parts; a transponder reader arranged to interrogate the plurality of transponders, with each transponder arranged to respond to said interrogation with a signal, said signal including at least the unique identifier; a control system having a database containing parameters relating to said device, the control system arranged to receive data from the transponder reader, said data including the unique identifier for each interrogated transponder; wherein the control system is further arranged to

20

compare the data from the transponder reader to the database and determine the status of the parts based on the received unique identifiers.

In a second aspect, the invention provides a method for determining the status of parts within a device, the method comprising the steps of: providing a plurality of transponders, each corresponding to one of said parts, each of said plurality of transponders storing a unique identifier; interrogating the plurality of transponders with a transponder reader; the transponders responding to the interrogation with a signal, said signal including at least the unique identifier; providing a control system having a database containing parameters relating to said device, the control system receiving data from the transponder reader, said data including the unique identifier for each interrogated transponder; the control system comparing the data from the transponder reader to the database and; determining the status of the parts based on the received unique identifiers.

15

It follows that the transponder reader may continually or continuously interrogate the transponder to obtain the unique identifiers for each transponder. Such interrogation may also determine the presence of the transponder to ensure for instance safe operation of the equipment. Alternatively, the transponder reader may only interrogate the transponders at start-up of the device.

20

Maintaining the example of the device being an IC dicing machine and the parts being components of a net table if each part were to include a transponder, the control system may communicate with the transponder reader to ensure the presence of each

transponder within the net table assembly. If one transponder stops functioning, the transponder reader may identify this fact through its interrogation and so permit the control system to output a suitable response.

- 5 In a further embodiment, if through interrogation the control system identifies that each component has a transponder signal but the unique identifier of said transponder is inconsistent with the database, the control system may determine that the wrong component has been used, for instance a component compatible with a different though similar device.

10

- In a further embodiment, if the unique identifiers from the transponders are consistent, the control system may interact with an operating system of the device in order to configure the device to be consistent with the unique identifier. For instance, if the consistent transponder signal corresponds to a 3 x 3 arrangement of IC units within a
- 15 substrate, the control system may inform the operating system to configure to the corresponding 3 x 3 configuration. Thus if in initialising the device to a new batch of substrates, the maintenance team neglects to reconfigure the operating system, the control system may automatically perform this task and so avoid re-initialisation and so avoiding costly down time.

20

Further, if the control system identifies that, the unique identifier is consistent for one configuration but a re-initialisation of the operating system would be inconsistent with the hardware installed on the device, the control system may prevent operation of the device and so avoid damage to the device.

In a further embodiment, the control system may be in communication with a communication system for receiving and transmitting external transmissions. Thus the control system may be configured to communicate either safe operation or transmit a problem based upon information from the transponder reader.

Further the control systems may be configured to receive a signal externally so as to permit a degree of operability based upon receiving a remote signal. For instance, a signal received by the control system may permit re-initialisation of the operating system based upon a new batch of equipment. Alternatively the control system may receive a remote signal to shut down operation of the device based on certain parameters. In a further embodiment, if the transponder reader interrogates the transponders and finds an inconsistent identifier or a transponder is missing from the device, this information may be transmitted to the control system which then transmits a communication to a remote station. The result may include the remote station transmitting a shut down signal to the control system so as to ensure the device does not operate under unsafe or uncontrolled conditions.

In one embodiment, the operating system may receive an input from an operator with an operator code identifying the operator. The control system may then compare the operator identification with the signal received from the transponder reader to ensure the operator is qualified to operate the device based upon the configuration of the device. In a further embodiment the operating system may communicate to the control system problems with operation of the device. For instance such problems may include

jamming, waste above pre-determined threshold, feedback from inspection stations within the device output rate etc. This information from the operating system to the control system may then be communicated to the operator or to a remote station for determination or recording of said information at a remote location. Said remote
5 location may be a central point within a factory with the essential point responsible for several devices within the factory. Alternatively, the central location may be a regional centre responsible for multiple factory sites.

The transponder may communicate with the transponder reader through WIFI, blue-
10 tooth or RF signals.

The means of communication from the control system to the remote location may be through WIFI, direct internet connection, SMS or other communication system.

15 The operator ID may be introduced to the operating system through a code entered to the system, a swipe card, an RFID card or biometric identification such as finger print or retina scan.

Further the control system may include communication with a GPS device for
20 determining the location of the device. In this embodiment, the control system may then communicate the location of the device to the remote stations.

In a further embodiment, in the case of the control system shutting down the device, reactivation of the device may be through operator input, an automatic time reactivation

or through receiving a remote signal such that the device cannot be reactivated unless an authorised signal from the remote station is received.

Brief Description of Drawings

5

It will be convenient to further describe the present invention with respect to the accompanying drawings that illustrate possible arrangements of the invention. Other arrangements of the invention are possible and consequently, the particularity of the accompanying drawings is not to be understood as superseding the generality of the
10 preceding description of the invention.

Figure 1 is a schematic view of devices according to one embodiment of the present invention.

Figure 2 is a schematic view of devices according to a further embodiment of the
15 present invention.

Figure 3 is a schematic view of devices according to a further embodiment of the present invention.

Figure 4 is a schematic view of devices according to a further embodiment of the present invention.

20 Figure 5 is a detailed view of a component of the device according to one embodiment of the present invention.

Detailed Description

Figure 1 shows two devices 5, 10, the first device 5 having component assemblies 35, 40, and 45 and the second device 10 having component assemblies 50, 55 and 60.

Each of the components of the first device 5 comprise a plurality of parts, with the
5 components 35, 40 and 45 having parts 36A to 36E, 41A to 41E and 46A to 46E. Similarly, the components 50, 55 and 60 of the second device 10 having parts 50A to 50E, 56A to 56E and 61A to 61E. Embedded in each part is a transponder (not shown).

The first and second devices 5, 10 have transponder readers 25, 30 arranged to
10 interrogate the transponders of each part, whereupon the transponders send a signal containing, at least, a unique identifier.

The transponder reader 25, 30 is arranged to send a data signal to a control system, with the signal including the unique identifier for each transponder responding to the
15 interrogation. The unique identifier includes may be cross referenced against a database accessible to the control system, and so provide information on the type of part, its intended location within the component and the device, the device type etc.

In Figure 2 we have a condition where two parts 56B, 61B of components 55, 60 within
20 the second device 10 have been inadvertently swapped 65.

On interrogation, the transponder reader receives the unique identifiers which are transmitted to the control system. The control system determines that the parts are correct, but in incompatible locations (i.e. the wrong components), and so registers a

device fault. Therefore, the unique identifier from each of the transponders whilst being consistent with the database, are inconsistent with the position within each component.

In Figure 3, following interrogation, the unique identifier from one part of a component
5 40 within the first device 5 has not been received. Accordingly, the control system
determines that either the part is missing 70, or the part being used does not have a
transponder, and therefore is a non-genuine and potential incompatible part. In either
case, the control system will register a device fault, with the inconsistent condition
recorded.

10

In Figure 4, following interrogation the unique identifier from one part 75 of a
component 45 within the first device 5 is received, but on comparison with the database,
is shown to be from a different device, and so may not be compatible, and hence the so
registration of a device fault

15

In each of the scenarios of Figures 2 to 4, the control system may consequently act in a
number of different ways to the registration of a device fault. For instance, an alert may
be sent to the operator, to a central location within the factory, to a regional centre or
some other remote location such as to the manufacturer of the device. It will be
20 appreciate that several methods of communication are possible, including an internet
connection, SMS, direct telephone connection etc. The method of communication may
vary based upon the location of the recipient.

Further, the control system may also stop operation of the device, permit limited use or merely record the data. Such limited use may be limited in terms of a time limit before stopping operation or limited in the rate of production.

5 Figure 5 shows a close up of one part 80, in this case, a net table for receiving an IC unit 85, said net table having a conversion kit 90 mounted thereto. An RFID tag 100 being the transponder according to one embodiment of the present invention is embedded within a recess of the metal body of the conversion kit 90 and encased in an epoxy moulding 95. Thus the placement of the transponder, in this case, an RFID tag may be
10 embedded within the part. Alternatively the RFID tag may be sprayed or glued to the part subject to the form of the RFID tag.

Claims

1. A device comprising

A plurality of components, each having an assembly of inter-operable parts;

a plurality of transponders in each of which is stored a unique identifier;

5 each of said plurality of transponders corresponding to one of said parts;

a transponder reader arranged to interrogate the plurality of transponders, with each transponder arranged to respond to said interrogation with a signal, said signal including at least the unique identifier;

a control system having a database containing parameters relating to said device,

10 the control system arranged to receive data from the transponder reader, said data including the unique identifier for each interrogated transponder;

wherein the control system is further arranged to compare the data from the transponder reader to the database and determine the status of the parts based on the received unique identifiers.

15

2. A device according to claim 1, wherein the control system is arranged to register a device fault on determining inconsistency between the data and the database.

3. A device according to claim 2, wherein an inconsistency includes any one or a
20 combination of: a missing unique identifier, a unique identifier for a different device, a unique identifier for a part in a different component.

4. A device according to any one of claims 1 to 3, further including an external communication system for receiving and transmitting external transmissions, said communication system in communication with the control system.
- 5 5. A device according to claim 4, wherein the control system is arranged to transmit a signal to a remote station on registration of a device fault.
6. A device according to claim 5, wherein said remote station includes any one or a combination of: a central location with a factory, a regional centre or a
10 manufacturer of the device.
7. A device according to any one of claims 2 to 6, wherein the control system is arranged to stop operation of the device on registration of a device fault.
- 15 8. A device according to claim 5, wherein the control system is arranged to stop operation of the device on registration of a device fault.
9. A method for determining the status of parts within a device, the method comprising the steps of:
20 providing a plurality of transponders, each corresponding to one of said parts, each of said plurality of transponders storing a unique identifier;
interrogating the plurality of transponders with a transponder reader;
the transponders responding to the interrogation with a signal, said signal including at least the unique identifier;

providing a control system having a database containing parameters relating to said device,

the control system receiving data from the transponder reader, said data including the unique identifier for each interrogated transponder;

5 the control system comparing the data from the transponder reader to the database and;

determining the status of the parts based on the received unique identifiers.