CLAIMS

1. A seal material handling monitoring device, sealing being performed by sandwiching a seal material in a flange joint and tightening the seal material by means of a plurality of bolts, the seal material handling monitoring device comprising:

a processor which generates a plurality of coordinates that extend radially from a center point; displays target axial forces of the bolts or detected axial forces of the bolts, via each of the coordinates, as a distance from the center point; generates a first distribution map from the target axial forces or a second distribution map from the detected axial forces, at the coordinates, by linking between the target axial forces or the detected axial forces at adjacent coordinates; determines whether the detected axial forces lie within tolerance of the target axial forces; determines that the axial forces are accepted if the detected axial forces lie within the tolerance of the target axial forces; determines that the axial forces are rejected if the detected axial forces lie out of the tolerance; and displays a determination result on a monitor.

2. The seal material handling monitoring device according to claim 1, wherein the processor displays the first distribution map and the second distribution map such that the first and second distribution maps are superposed via common coordinates.

3. A seal material handling monitoring device, sealing being performed by sandwiching a seal material in a flange joint and tightening the seal material by means of a plurality of bolts, the seal material handling monitoring device comprising:

a plurality of first sensors that detect an axial force of each bolt;

an information generation unit that generates distribution information of a target axial force by means of the target axial force and position information for the axial force, and generates distribution information of the axial force by means of the axial force and position information;

a monitor that presents a first distribution map representing the target axial force and presents a second distribution map representing the axial force, via coordinates; and

a second sensor that detects parallelism between flanges of the flange joint,

wherein the information generation unit generates parallelism information by means of a sensor output from the second sensor, and the monitor presents a third distribution map representing parallelism between the flanges.

4. The seal material handling monitoring device according to claim 3, wherein the information generation unit also refers to a tightening torque which is calculated by means of dimension information for the flanges of the flange joint and the bolts, determines, for each bolt, whether a tightening force for the seal material has reached a target tightening force configured for each seal material, and presents determination results to the monitor.

5. The seal material handling monitoring device according to claim 3, wherein, by changing a position or an angle of a seal handling unit that includes the flange joint or by changing a position or an angle of the flange joint, a work environment can be simulated.

6. A seal material handling monitoring program for causing a computer to implement functions to:

generate a plurality of coordinates that extend radially from a center point, display target axial forces of bolts or detected axial forces of the bolts, via each of the coordinates, as a distance from the center point, and generate a first distribution map from the target axial forces or a second distribution map from the detected axial forces, at the coordinates, by linking between the target axial forces or the detected axial forces at adjacent coordinates; and

determine whether the detected axial forces lie within tolerance of the target axial forces, determine that the axial forces are accepted if the detected axial forces lie within the tolerance of the target axial forces, determine that the axial forces are rejected if the detected axial forces lie out of the tolerance, and display a determination result on a monitor.

7. The seal material handling monitoring program according to claim 6, for further causing the computer to implement a function to display the first distribution map and the second distribution map such that the first and second distribution maps are superposed via common coordinates.

8. A seal material handling monitoring program for causing a computer to implement functions to:

receive a sensor output from a plurality of first sensors that detect an axial force of each bolt,

generate distribution information of a target axial force by means of the target axial force and position information for the axial force, and generate distribution information of the axial force by means of the axial force and position information;

present a first distribution map representing the target axial

force and present a second distribution map representing the axial force, via coordinates;

receive a sensor output from a second sensor that detects parallelism between flanges of a flange joint;

generate parallelism information by means of the sensor output from the second sensor; and

present a third distribution map representing the parallelism between the flanges.

9. The seal material handling monitoring program according to claim 8, for further causing the computer to implement functions to:

configure a target tightening force for each seal material, determine, for each bolt, whether a tightening force for the seal material has reached the target tightening force, and

present the determination results via a monitor.

10. A seal material handling monitoring program for causing a computer to implement functions to:

receive a sensor output from a plurality of first sensors that detect an axial force of each bolt;

generate distribution information of a target axial force by means of the target axial force and position information for the axial force, and generate distribution information of the axial force by means of the axial force and position information;

present a first distribution map representing the target axial force and present a second distribution map representing the axial force, via coordinates; and

determine a tightening procedure for each bolt, and present the determination results to a monitor.

11. A seal material handling monitoring method, sealing being performed by sandwiching a seal material in a flange joint and tightening the seal material by means of a plurality of bolts, the seal material handling monitoring method comprising:

a step of generating, by graphical information generation means, a plurality of coordinates that extend radially from a center point, displaying target axial forces of the bolts or detected axial forces of the bolts, via each of the coordinates, as a distance from the center point, and generating a first distribution map from the target axial forces or a second distribution map from the detected axial forces, at the coordinates, by linking between the target axial forces or the detected axial forces at adjacent coordinates; and

a step of determining whether the detected axial forces lie within tolerance of the target axial forces, determining that the axial forces are accepted if the detected axial forces lie within the tolerance of the target axial forces, determining that the

axial forces are rejected if the detected axial forces lie out of the tolerance, and displaying a determination result on a monitor.

12. A seal material handling monitoring method, sealing being performed by sandwiching a seal material in a flange joint and tightening the seal material by means of a plurality of bolts, the seal material handling monitoring method comprising:

a step of detecting an axial force of each bolt;

a step of generating distribution information of a target axial force by means of the target axial force and position information for the axial force, and generating distribution information of the axial force by means of the axial force and position information;

a step of presenting a first distribution map representing the target axial force and presenting a second distribution map representing the axial force, via coordinates;

a step of detecting parallelism between flanges of the flange joint;

a step of generating parallelism information by means of the parallelism; and

a step of presenting a third distribution map representing the parallelism between the flanges.

13. A seal material handling monitoring system, sealing being performed by sandwiching a seal material in a flange joint and tightening the seal material by means of a plurality of bolts, the seal material handling monitoring system comprising:

a seal handling unit including a first sensor that detects axial forces of a plurality of bolts which tighten a seal material sandwiched in a flange joint, or a second sensor that detects parallelism between flanges of the flange joint; and

a processor which generates a plurality of coordinates that extend radially from a center point; displays target axial forces of the bolts or detected axial forces of the bolts, via each of the coordinates, as a distance from the center point; generates a first distribution map from the target axial forces or a second distribution map from the detected axial forces, at the coordinates, by linking between the target axial forces or the detected axial forces at adjacent coordinates; determines whether the detected axial forces lie within tolerance of the target axial forces; determines that the axial forces are accepted if the detected axial forces lie within the tolerance of the target axial forces; determines that the axial forces are rejected if the detected axial forces lie out of the tolerance; and displays a determination result on a monitor.

14. A seal material handling monitoring system, sealing being performed by sandwiching a seal material in a flange joint and

tightening the seal material by means of a plurality of bolts, the seal material handling monitoring system comprising:

a seal handling unit including a sensor that detects parallelism between flanges of the flange joint;

an information generation unit which is connected to the sensor by means of a wired or wireless connection, and which generates parallelism information by means of the parallelism; and

a monitor which is connected to the information generation unit by means of a wired or wireless connection, and which presents a distribution map representing the parallelism.

15. A seal material handling training system, sealing being performed by sandwiching a seal material in a flange joint and tightening the seal material by means of a plurality of bolts, the seal material handling training system comprising:

a seal handling unit including a first sensor that detects axial forces of a plurality of bolts which tighten a seal material sandwiched in a flange joint, or a second sensor that detects parallelism between flanges of the flange joint; and

a processor which generates a plurality of coordinates that extend radially from a center point; displays target axial forces of the bolts or detected axial forces of the bolts, via each of the coordinates, as a distance from the center point; generates a first distribution map from the target axial forces or a second distribution map from the detected axial forces, at the coordinates, by linking between the target axial forces or the detected axial forces at adjacent coordinates; determines whether the detected axial forces lie within tolerance of the target axial forces; determines that the axial forces are accepted if the detected axial forces lie within the tolerance of the target axial forces; determines that the axial forces are rejected if the detected axial forces lie out of the tolerance; and displays a determination result on a monitor.

16. A seal material handling training system, sealing being performed by sandwiching a seal material in a flange joint and tightening the seal material by means of a plurality of bolts, the seal material handling training system comprising:

a seal handling unit including a sensor that detects parallelism between flanges of the flange joint;

an information generation unit which is connected to the sensor by means of a wired or wireless connection, and which generates parallelism information by means of the parallelism; and

a monitor which is connected to the information generation unit by means of a wired or wireless connection, and which presents a distribution map representing the parallelism.