CLAIMS

1. A pipe handling system comprising a pipe gripping tool rotatably connected to a pipe handling arm by an articulated joint, the pipe gripping tool having gripping devices for gripping and holding a tubular element,
c h a r a c t e r i s e d i n that the pipe handling arm further comprises a first coupling half of a coupling for fully automatic connection to a work tool and disconnection from the work tool, said first coupling half being arranged on the pipe gripping tool such that the work tool that comprises a second coupling half of said coupling, the second coupling half being complementarily shaped to the first coupling half on the pipe gripping tool, can be connected to and disconnected from the pipe handling arm.

2. A pipe handling system according to claim 1,
c h a r a c t e r i s e d i n that the pipe handling system is adapted for fully automatic connection to and disconnection from the work tool.

3. A drill floor system for performing a plurality of fully automatic work operations on a drill floor, which drill floor system comprises:

- at least one fully automatic pipe handling system according to claim 1 or 2 and at least one work tool for performing a number of different work operations on the drill floor, where the at least one pipe handling arm and the at least one work tool are adapted for fully automatic connection of the at least one work tool to the at least one pipe handling arm and fully automatic disconnection of a connected work tool from the at least one pipe handling arm;
- a control system that is at least adapted to control the movements of the pipe handling arm, the automatic connection of a work tool to the at least one pipe handling arm and the automatic disconnection of a work tool from the at least one pipe handling arm, such that a plurality of work operations on the drill floor, with the use of respective work tools, can be automated and performed without the assistance of personnel.

4. A drill floor system according to claim 3,
c h a r a c t e r i s e d i n that the at least one work tool comprises at least one holding device for gripping and holding a downhole device on the drill floor.

5. A drill floor system according to claim 3 or 4,
c h a r a c t e r i s e d i n that the drill floor system comprises a separate storage space for each work tool and/or a downhole device in which the work tools are placed when they are disconnected from the at least one pipe handling arm.

6. A drill floor system according to one of claims 3-5, c h a r a c t e r i s e d i n that the drill floor system comprises at least one tool store comprising a plurality of storage spaces for at least one work tool and/or at least one downhole device.

7. A drill floor system according to claim 6, c h a r a c t e r i s e d i n that the at least one downhole device comprises a bottom hole assembly (BHA) component.

8. A drill floor system according to one of claims 5-7, c h a r a c t e r i s e d i n that the storage spaces comprise a holding device for holding the work tools in a fixed position in their respective storage spaces.

9. A drill floor system according to claim 8, c h a r a c t e r i s e d i n that the first coupling half on the at least one pipe handling arm comprises a position-determining device for determining the position of the first coupling half on the drill floor, which position-determining device is signally connected to the control system.

10. A drill floor system according to one of claims 8-9, c h a r a c t e r i s e d i n that the second coupling half on the at least one work tool comprises a position-determining device for determining the position of the second coupling half on the drill floor, which position-determining device is signally connected to the control system.

11. A drill floor system according to one of claims 3-10, c h a r a c t e r i s e d i n that the at least one pipe handling system is movably arranged on the drill floor for vertical and/or horizontal movement of the at least one pipe handling arm relative to the drill floor.

12. A drill floor system according to one claims 3-11, c h a r a c t e r i s e d i n that the control system is adapted to at least register and remember the respective disconnected positions of the at least one work tool and at least one downhole device, to monitor and control movements of the at least one pipe handling system and to monitor and control fully automatic connection of a work tool or a downhole device to the at least one pipe handling arm and fully automatic disconnection of a work tool or a downhole device from the at least one pipe handling arm.

13. A drill floor system according to one of claims 3-12, c h a r a c t e r i s e d i n that the drill floor system comprises a plurality of pipe handling arms that are adapted for fully automatic connection of a work tool to each of the pipe handling arms and fully automatic disconnection of a work tool from the pipe handling arms.

14. A method for performing a plurality of work operations on a drill floor where the work operations are performed by a pipe handling system according to claim 1 or 2, and a drill floor system according to one of claims 3-13 comprising at least one work tool, the method comprising:

- fully automatic connection of the at least one work tool to the at least one pipe handling arm;
- performance of at least one fully automatic work operation with the at least one work tool;
- fully automatic disconnection of the at least one work tool from the at least one pipe handling arm when the at least one fully automatic work operation has been performed.

15. A method according to claim 14,
c h a r a c t e r i s e d i n that the at least one fully automatic work operation comprises connecting at least one downhole device to a pipe string or to another downhole device.

16. A method according to claim 15,
c h a r a c t e r i s e d i n that the at least one downhole device comprises at least one component of a bottom hole assembly and that the at least one fully automatic work operation comprises connecting the at least one component of the bottom hole assembly to a pipe string or to another component of the bottom hole assembly.

17. A method according to claim 15 or 16,
c h a r a c t e r i s e d i n that each downhole device and/or work tool is placed in a separate storage space, preferably in a tool store, when they are disconnected from the at least one pipe handling arm.

18. A method according to one of claims 14-17,
c h a r a c t e r i s e d i n that each work tool is placed in a tool store comprising a plurality of storage spaces for respective work tools when they are disconnected from the at least one pipe handling arm.

19. A method according to one of claims 15-18,
c h a r a c t e r i s e d i n that each downhole device is placed in a tool store comprising a plurality of storage spaces for respective downhole devices when they are disconnected from the at least one pipe handling arm.

20. A method according to one of claims 15-19,
c h a r a c t e r i s e d i n that the at least one work tool is disconnected from the at least one pipe handling arm before the at least one pipe handling arm is to handle a tubular element.