CLAIMS

1. A method of assisting installation of construction elements in a construction work, the method comprising:

- projecting layout information on a working surface of the construction work, wherein the projected layout information is obtained from a model of a portion at least of the construction work and includes first graphical information depicting a reference feature visible on the working surface, and second graphical information designating at least one location for installation of a construction element, the location being linked, in the model, to the reference feature depicted by the first graphical information; and
- in response to a user action of selecting the first graphical information and a geometric transformation, changing the projected first and second graphical information together in accordance with the selected transformation.

2. The method as claimed in claim 1, wherein selecting the first graphical information comprises:

- detecting activation of a handheld beacon;
- determining spatial coordinates of the activated beacon; and
- selecting the first graphical information if the determined spatial coordinates match a projection position of the first graphical information.

3. The method as claimed in claim 2, wherein the geometric transformation is selected as a translation along the working surface, and wherein selecting the translation comprises:

- tracking the beacon in an activated state;
- determining spatial coordinates of the beacon being tracked;
- detecting deactivation of the beacon; and
- determining the selected translation based on the spatial coordinates of the beacon upon activation and the spatial coordinates of the beacon upon deactivation.

4. The method as claimed in any one of the preceding claims, further including a setup phase comprising:

- placing projection equipment in front of the working surface;
- detecting a plurality of activations of a handheld beacon;
- determining spatial coordinates of the beacon upon each detected activation;
- acquiring parameters of a spatial relationship between the projection equipment and the working surface as a function of the determined spatial coordinates; and
- determining data for projecting the layout information on the working surface from the projection equipment based on the model and the acquired parameters of the spatial relationship.

5. The method as claimed in claim 4, wherein the setup phase further comprises projecting symbols on the working surface to prompt a user to successively activate the beacon at locations of the projected symbols.

6. The method as claimed in any one of claims 4-5, wherein the projection equipment is associated with a positioning system to evaluate position and orientation thereof with respect to the model.

7. The method as claimed in claim 6, wherein the positioning system comprises a rangefinder to provide distance information between the working surface and the projection equipment, wherein said distance information is processed to automatically adjust a scale of the projected layout information.

8. The method as claimed in any one of claims 6-7, wherein the positioning system comprises a camera, the method further comprising analyzing an output signal of the camera to assist in positioning and scaling of the projected layout information.

9. The method as claimed in any one of the preceding claims, wherein a plurality of reference features visible on the working surface are defined in the model, wherein the projected layout information includes first graphical information depicting each of the plurality of reference features visible on the working surface, and wherein the first graphical

information depicting one of the plurality of reference features is independently changeable in response to a user action of selecting said first graphical information and a respective geometric transformation.

10. The method as claimed in any one of the preceding claims, wherein the model further includes positional tolerance attributes for at least some of the construction elements.

11. The method as claimed in claim 10, further comprising:

- processing the positional tolerance attribute for a construction element so as to indicate, on the working surface, a range around the designated location for installation of said construction element.

12. The method as claimed in any one of the preceding claims, wherein the model has a data structure defining construction element subsets respectively associated with a plurality of reference features, and wherein for each subset associated with a reference feature, the data structure includes a respective position attribute indicating a relative position of said subset with respect to said reference feature.

13. The method as claimed in claim 12, wherein the data structure of the model further includes inter-subset arrangement rules defining acceptable positions of a construction element subset relatively to other subsets.

14. The method as claimed in claim 13, further comprising:

- projecting a visual indication of inter-subset arrangement rules on the working surface in connection with each construction element subset associated with a reference feature visible on the working surface.

15. The method as claimed in any one of claims 12-14, further comprising:

- in response to a user action of selecting the second graphical information designating a location for installation of a construction element of a subset on the working surface and a displacement along the working surface, shifting the second graphical information projected on the working surface to designate the locations for

installation of the construction elements of said subset in accordance with the selected displacement, independently of the first graphical information depicting the reference feature to which said subset is associated.

16. The method as claimed in claim 15, wherein shifting the second graphical information independently of the first graphical information is performed on condition that the selected displacement is within any positional tolerance attributes defined in the model for construction elements of said subset.

17. The method as claimed in any one of claims 15-16, wherein shifting the second graphical information independently of the first graphical information is performed on condition that the selected displacement complies with inter-subset arrangement rules provided in the model to define acceptable positions of construction element subsets relatively to other subsets.

18. The method as claimed in any one of claims 15-17, further comprising, following shifting of the second graphical information independently of the first graphical information:

- updating the position attribute for said construction element subset in the data structure of the model based on the selected displacement.

19. The method as claimed in any one of the preceding claims, further comprising, following a change of the projected first and second graphical information in response to a user action of selecting the first graphical information and a geometric transformation:

- modifying an as-built version of the model to reflect the change.

20. The method as claimed in any one of the preceding claims, wherein the model of a portion at least of the construction work is a Building Information Model (BIM).

21. The method as claimed in any one of the preceding claims, further comprising projecting a scale indication along at least one dimension of the working surface.

22. A system for assisting installation of construction elements in a construction work, the system comprising:

- projection equipment for projecting layout information on a working surface of the construction work;
- a processor having access to a model of a portion at least of the construction work, for controlling the projection equipment such that the projected layout information includes first graphical information depicting a reference feature visible on the working surface, and second graphical information designating at least one location for installation of a construction element, the location being linked, in the model, to the reference feature depicted by the first graphical information; and
- a user interface for detecting a user action of selecting the first graphical information and a geometric transformation, wherein the processor is configured to control the projection equipment, in response to the detected user action, by changing the projected first and second graphical information together in accordance with the selected transformation.

23. The system as claimed in claim 22, wherein the user interface comprises a handheld beacon and a total station for determining spatial coordinates of the beacon.

24. The system as claimed in any one of claims 21-22, wherein the processor is further configured, with the projection equipment and the user interface, to control execution of steps of a method in accordance with any one of claims 2-21.

25. A computer program for assisting installation of construction elements in a construction work, the program comprising instructions to be executed in a processor associated with projection equipment, a user interface and an interface with a model of a portion at least of the construction work, wherein execution of the instructions controls:

- projecting layout information on a working surface of the construction work, wherein the projected layout information is obtained from the model and includes first graphical information depicting a reference feature visible on the working surface, and second graphical information designating at least one location for installation of a construction element, the location being linked, in the model, to the reference feature depicted by the first graphical information; and

- in response to a user action of selecting the first graphical information and a geometric transformation, changing the projected first and second graphical information together in accordance with the selected geometric transformation.

26. A method of structuring information in a model of a portion at least of a construction work, the method comprising:

- for each of a plurality of reference features visible on at least one working surface of the construction work, storing first data in the model defining a 3D position of said reference feature;
- for each of a plurality of construction elements to be installed on the working surface, storing second data in the model describing at least one location for installation of said construction element; and
- defining, in the model, construction element subsets respectively associated with the reference features, wherein for each subset associated with a reference feature, the second data include a respective position attribute indicating a relative position of said subset with respect to said reference feature.

27. The method as claimed in claim 26, wherein for at least some of the construction elements, the second data further include a positional tolerance attribute parallel to the working surface.

28. The method as claimed in any one of claims 26-27, further comprising storing in the model representations of inter-subset arrangement rules defining acceptable positions of a construction element subset relatively to other subsets.