Claims

1. Method (100) for monitoring a state of a physical passenger transport system (2) using an actualized digital replica dataset ADRD (102) which includes characterizing properties of components of the physical passenger transport system (2) in a machine-processable manner after assembly and installation thereof in a building (5), wherein at least one detection device (200) is arranged in the physical passenger transport system (2) and detects changes in at least one characterizing property that is caused by wear on a traveling physical component (7, 11, 31, 36) of the physical passenger transport system (2), characterized in that the ADRD (102) is generated by:

- Creating a commissioning digital replica dataset (135) from component model datasets (114 – NN) with target data which reproduce characterizing properties of components of the passenger transport system (2) in a target configuration;
- Creating a production digital replica dataset based on the commissioning digital replica dataset (135) by measuring actual data which reproduce characterizing properties of components of the physical passenger transport system (2) in the actual configuration of the passenger transport system (2) immediately after assembly and installation thereof in a building (5) and replacing target data in the commissioning digital replica dataset (135) with corresponding actual data; and,
- Creating and continuously updating the ADRD (102) based on the production digital replica dataset by modifying the production digital replica dataset during the operation of the physical passenger transport system (2), taking into account measured values acquired by the detection device (200) which reproduce changes in characterizing properties of traveling components (7, 11, 31, 36) of the physical passenger transport system (2) during its operation; in that these changes are transmitted to the ADRD (102) as measurement data and the characterizing properties of the component model datasets (114 – NN) affected by the transmitted measurement data are updated accordingly;

wherein the measurement data transmitted by the detection device (200) are stored in a log file (104) with time information (103), and

wherein a change trend of the measured values is determined by means of statistical methods using the measurement data stored in the log file (104) and operating data stored in the log file (104).

2. Method (100) according to claim 1, wherein monitoring can be used to track and evaluate changes and trends in changes in the at least one updated characterizing property of the traveling physical component (7, 11, 31, 36) and influence of said changes on the component (7, 11, 31, 36) and on the components interacting with this component with the assistance of the ADRD (102) using calculations and/or using static and dynamic simulations.

3. Method (100) according to claim 1 or claim 2, wherein the transmission of the measured values takes place periodically or as a function of the change trend of the measured values.

4. Method (100) according to one of the preceding claims, wherein the wear-related characterizing property of the traveling physical component (7, 11, 31, 36) is selected from a group comprising geometric dimensions of the component, weight of the component, and surface quality of the component.

5. Method (100) according to claim 4, wherein the characterizing property of the traveling physical component (7, 11, 31, 36) measured by the detection device (200), which characterizing property is changed due to wear, is the length of a drive chain (36) or is slack in the drive chain (36) resulting from wear-related change in length, is the length of a conveyor chain (31) or a displacement of a deflection curve (39) resulting from the wear-related change in length in the conveyor chain tensioning device (40) thereof, or is the length of a handrail (11) or a displacement of a roller curve (83) resulting from the wear-related change in length of the handrail tensioning device (80) thereof.

6. Method (100) according to any of the preceding claims, wherein monitoring of the state of the physical passenger transport system (2) includes simulating future characterizing properties of the physical passenger transport system (2) using the ADRD (102).

7. Method (100) according to any of the preceding claims, further comprising: planning of maintenance work to be carried out on the physical passenger transport system (2) based on information about the monitored state of the passenger transport system (1).

8. Method (100) according to any of the preceding claims, further comprising: evaluating quality properties of one of the traveling components (7, 11, 31, 36) based on an analysis of the ADRD (102) of a plurality of passenger transport systems (2) containing the relevant traveling component (7, 11, 31, 36).

9. Method (100) according to any of the preceding claims, wherein creating the commissioning digital replica dataset (135) includes creating a digital replica dataset (121) from component model datasets (114, ..., NN) taking into account customer-specific configuration data (113), as well as creating production data by modifying the digital replica dataset (121) taking into account production-specific data (136).

10. Device (1) for carrying out the method according to any of claims 1 through 9, comprising:

- an ADRD (102) which reproduces characterizing properties of components of the physical passenger transport system (2) in an actual configuration of the physical passenger transport system (2) in a machine-processable manner after assembly and installation thereof in a building (5);
  and,
- at least one detection device (200) using which changes occurring in at least one characterizing property due to wear on a traveling physical component (7, 11, 31, 36) of the physical passenger transport system (2) can be detected;

wherein these changes can be transmitted to the ADRD (102) as measurement data for the purpose of updating existing data, characterized in that the ADRD (102) can be generated by:

- Creating a commissioning digital replica dataset (135) with target data which reproduce the characterizing properties of components of the passenger transport system (2) in a target configuration;
- Creating a production digital replica dataset based on the commissioning digital replica dataset (135) by measuring actual data which reproduce characterizing properties of components of the passenger transport system (2) in the actual configuration of the passenger transport system (2) immediately after assembly and installation thereof in a building (5) and replacing target data in the commissioning digital replica dataset (135) with corresponding actual data,

wherein separate measuring devices and/or sensors integrated into components or arranged on components are available for measuring actual data; and,

- Creating and continuously updating the ADRD (102) based on the production digital replica dataset by modifying the production digital replica dataset during the operation of the physical passenger transport system (2), taking into account measured values acquired by the detection device (200) which reproduce changes in the characterizing properties of traveling components (7, 11, 31, 36) of the physical passenger transport system (2) during operation thereof.

11. Physical passenger transport system (2) comprising a device (1) according to claim 10.

12. Computer program product (101) comprising machine-readable program instructions (166) which, when executed on a programmable device (50, 111), cause the device (1) according to claim 10 to carry out or control a method (100) according to any of claims 1 through 9.

13. Computer-readable medium having a computer program product (101) according to claim 12 stored thereon.