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Applications of advanced industrial robot functions for enhancing robot operation and controls

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Industrial robots have been the important elements in today's automated manufacturing systems. Industrial practices show that among many other factors the robots' accuracy and repeatability are the foundations for making industrial robot applications successful. As new functions and capabilities are embed in the current robot systems and new ways of designing robot applications are adopted by engineers for increasing flexibility and intelligence, the challenges of guaranteeing the robot position accuracy are still facing the designers and users of industrial robot applications. This study addresses the robot design solutions to robot position accuracy problems raised by the new robot program developments technique such as new robot calibration functions, robot offline programming (OLP) software, robot vision data integration, and robot force and torque sensing. To aid the discussion of the developed methods, functions of FANUC LR MATE 200iC robot, FANUC Visloc vision system, FANUC Handling PRO simulation software, and FANUC torque sensor are presented with examples and case studies.

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Demand response and smart grids

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The smart grid is conceived as an electric grid able to deliver electricity in a controlled, smart way from points of generation to active consumers. Demand response (DR), by promoting the interaction and responsiveness of the customers, may offer a broad range of potential benefits on system operation and expansion and on market efficiency. Moreover, by improving the reliability of the power system and, in the long term, lowering peak demand, DR reduces overall plant and capital cost investments and postpones the need for network upgrades. Lessons learnt from industrial case studies and research projects evidenced that DR can be employed for overall load reductions in response to peak power concerns and for ancillary services for frequency regulation with faster scale response times (up to 4-sec response times). Advanced DR programs and innovative enabling technologies are required for such applications and to support the coordination of DR in a SG. Enabling technologies, such as smart meters, AMI, home energy controllers, EMS, wired and wireless communication systems are presented and discussed referring to real industrial case studies and research projects. Important areas for research that require to be further investigated in this field include measurement and settlement processes, developments in integrated electronic circuits, optimization and control systems, information and communications technologies. The integration of storage devices, distributed generation and on-site renewable generation in automated DR brings additional flexibility and complexity that should be coped with innovative technologies and methods.

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