Current production plants are highly customizable and flexible in their processes. This flexibility is mainly realized by software. It causes an increasing complexity of control software components and the need of new methods for comprehensive and automated testing approaches to ensure a requested level of quality at high efficiency. A survey among mechanical engineering companies of the industries aerospace, automotive and machine/plant automation was conducted. Aspects of requirements engineering, testing, simulation, processes, tools, etc. were addressed to reveal research demands of PLC (Programmable Logic Controller) control software development in machine/plant automation. A system architecture embedding UML sequence diagrams for testing is proposed. We further contribute transformation rules of semantically adapted UML sequence diagrams to the cyclic execution logic of PLCs for reactive systems. The approach can be applied to any IEC 61131-3 programming language of the automation control software. A prototypical realization shows proof of concept and reveals the potential for future work.