

Questionnaire 1 (answers gathered from the end of 2015 until the beginning of 2016, referring to control code)

Number	Short designation	Question
Q1#1.01	In-house cooperation	<i>How is in-house cooperation organized?</i>
Q1#1.02	Document exchange	<i>Which development documents are exchanged in between different teams?</i>
Q1#1.03	Development documentation	<i>How is documentation realized during the development phase?</i>
Q1#1.04	Initiative for modularity	<i>Who initiates the usage of modularization for control applications?</i>
Q1#1.05	Extent of modularity	<i>What is modularized?</i>
Q1#1.06	Programming languages	<i>Which programming languages are used in your company (for field level control)?</i>
Q1#1.07	Use of library components	<i>How often are modules from libraries used?</i>
Q1#1.08	Release of library modules	<i>Please briefly describe the release process for library modules, starting with the initial creation and ending with the release.</i>
Q1#1.09	Version management tool	<i>Does your company use a version management tool?</i>
Q1#1.11	Change tracking	<i>How do you realize change tracking of versions in your company?</i>
Q1#1.13	Generation of new variants	<i>How is the decision made to create a new variant?</i>
Q1#1.14	Project templates	<i>Are projects automatically configured from libraries based on templates?</i>
Q1#1.15	Code generation	<i>How often does your company make use of code generation from EPLAN (E-CAE) or other engineering tools?</i>
Q1#1.16	Tools for code generation	<i>From which tools/models is PLC code generated?</i>

Questionnaire 2 (answers gathered from June 2016 until September 2016, referring to control code)

Number	Short designation	Question
Q2#0.1	Exchange during development phase	<i>Which disciplines exchange information during the development phase?</i>
Q2#0.2	Meetings of the disciplines	<i>How often do meetings take place in order to exchange information between the different disciplines on average?</i>
Q2#0.3	Requirement specification	<i>In which form is the specification of requirements available?</i>
Q2#0.4	Modeling tools	<i>Which modeling tools are used in your company?</i>
Q2#0.5	Interdisciplinary mechatronic modules	<i>Does your company use cross-disciplinary (mechanical, software and electrical engineering) mechatronic modules?</i>
Q2#0.6	Modularization	<i>What is modularized in your company?</i>
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Q2#1.01	Programming languages	<i>Which programming languages are used for control software in your company?</i>
Q2#1.02	Object-oriented extension of IEC 61131-3	<i>Do you use the object-oriented extension of the IEC 61131-3 programming languages?</i>
Q2#1.03	Standards referring to implementation	<i>Which standards do you adhere to for software implementation?</i>
Q2#1.04	Software standard functionalities	<i>What kind of software standard functions are used for control software projects in your company?</i>
Q2#1.05	Implementation of interfaces	<i>How are interfaces predominantly implemented in an average control software project?</i>
Q2#1.06	Standard functions of modules	<i>Which functions are included in every module by default?</i>
Q2#1.07	Amount of library modules	<i>How many library modules are used in an average control software project?</i>
Q2#1.08	Release of library modules	<i>What is the procedure from the creation to the release of a library module?</i>
Q2#1.09	Version management tool	<i>Which version management tool is used in your company?</i>
Q2#1.10	Disciplines using the version management tool	<i>Which disciplines are using the version management tool?</i>
Q2#1.11	Change tracking	<i>How does the change tracking of versions work?</i>

<b>Q2#1.13</b>	Variant management tool	<i>Which variant management tool is used in your company?</i>
<b>Q2#1.14</b>	Project templates	<i>Do you use an automated configuration of the control software based on project templates from engineering tools?</i>
<b>Q2#1.15</b>	Code generation	<i>From which tools/models is code generated?</i>
<b>Q2#1.16</b>	Templates	<i>Are software project templates used and adapted to new variants (machines/plants)?</i>
<b>Q2#1.17</b>	Composition of control software projects	<i>What are your current control software projects composed of on average?</i>

## Questionnaire 3 (answers gathered from summer to fall 2017)

Number	Short designation	Question
<b>Q3#1.15</b>	Self-assessment of reusability of mechatronic modules	<i>How experienced is your company when it comes to reusability of mechatronic modules?</i>
<b>Q3#1.15.1</b>	Reasons for an excellent self-rating in mechatronic modularity	<i>What are the reasons for your assessment?</i>
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<b>Q3#3.1d</b>	Universal module	<i>Does the control software (PLC) contain all possible variants (universal module)?</i>
<b>Q3#3.4</b>	Variant construction	<i>Is variant construction used?</i>
<b>Q3#3.4.1</b>	Variants of mechatronic modules	<i>Are there variants of mechatronic modules or are variants discipline-specific?</i>
<b>Q3#3.4.2</b>	Reasons for not using variant construction	<i>What are reasons for not using a variant construction?</i>
<b>Q3#3.4.3</b>	Problems occurring because of not using variant construction	<i>Which problems do occur in your company due to insufficient use of variant construction?</i>
<b>Q3#3.5</b>	Tools/models for code generation/configuration	<i>In case code generation is used: From which tools/models is code generation/configuration used considering the respective discipline?</i>
<b>Q3#3.6</b>	Object-oriented extension of IEC 61131-3	<i>Do you use the object-oriented extension of the IEC 61131-3 programming languages?</i>
<b>Q3#3.6.1</b>	Benefits of using object-oriented extension of IEC 61131-3	<i>In case you use the object-oriented extension of the IEC 61131-3 programming languages: What are the benefits?</i>
<b>Q3#3.6.2</b>	Merging of high-level programming languages and PLC programming	<i>To what extent will high-level programming languages and PLC programming (IEC 61131-3) merge with respect to your applications within the next few years?</i>