

CONTENTS

	List of symbols and abbreviations	9
1	Introduction, basic concepts, mission and objectives of monograph	12
1.1	Purpose, area of validity	12
1.2	Historical development of new products development	15
1.2.1	Development of new products according to standard boards ISO 9000	15
1.2.2	Development of new products according to standards VDA	18
1.2.3	Development of new products according to standards QS 9000	20
1.2.4	Development of new products according to standard - technical specification ISO/TS 16949	21
1.3	Map of processes and development new products	22
2	Basic requirements for the development, production and verification in accordance with ISO/TS 16949	24
2.1	Planning design and development	25
2.1.1	Multidisciplinary approach	25
2.2	Inputs for the design and development	27
2.2.1	Inputs for the design and development of product	28
2.2.2	Inputs for the design and development of manufacturing process	29
2.2.3	Special features	30
2.3	Outputs of design and development	30
2.3.1	Output of design and product development – appendix	31
2.3.2	Output of design manufacturing process	31
2.3.2.1	Plan of control and management	32
2.3.2.1.1	Contents the plan of control and management	32
2.3.2.1.2	Management of changes	34

2.3.2.2	Work instructions	35
2.4	Review of design and development	35
2.4.1	Monitoring	36
2.4.2	Control of records	36
2.5	Verification of design and development	36
2.6	Validation of design and development	37
2.6.1	Program production of prototype	37
2.6.2	Process ratification of product	38
2.7	Management of proposal changes	38
3.	Sequence the activities of development, production and verification the requirements of ISO/TS 16949 mentioned in chapter 2	38
3.0	Identification of process development, production and validation of new product	38
3.1	Sources of ideas for development and validation of new products and technologies	42
3.1.1	Proposals the department of development and technical preparation of production	42
3.1.2	Requirements of marketing department	42
3.1.3	Other sources of ideas	51
3.2	Assessment of proposals	51
3.3	Decision about development and validation	52
3.4	Plan of development	59
3.5	Stages (milestones) the management of proposal creating (Plan of development)	66
3.5.1	Development and construction, elaboration FMEA-K	67
3.5.2	Opponent dealing at 1. stage, discussion FMEA-K	73
3.5.3	Proposal the process of production and PKS, elaboration FMEA-V	77

3.5.3.1	Method Poka – Yoke	89
3.5.4	Opponent dealing at 3. stage, discussion FMEA-V	92
3.5.5	Construction documentation of tools and gauges	96
3.5.6	Manufacture of tools and gauges	98
3.5.7	Technical support the production of verification series	100
3.5.8	Production of verification series	104
3.5.9	Tests and measurements	109
3.5.10	Evaluation the running production of verification series and results of measurements and tests	122
3.5.11	Verification the proposal of process	122
3.5.11.1	Implementation of product audits	126
3.5.11.2	Regulation of manufacturing processes and their evaluation	138
3.5.11.3	Ability of machines	147
3.5.11.4	Ability of control and measuring devices (gauges)	151
3.5.11.5	Eligibility under the association of automobile manufacturers in Germany (VDA 6.1)	160
3.5.11.6	Method the remuneration of employees, working in system controlling of manufacturing processes	161
3.5.12	Final opponent dealing	170
3.5.13	Approval of series production	173
3.5.14	Documentation preparation of series production	175
3.6	Qualifying support for development and validation of new product	176
3.6.1	Qualifying requirements for development and validation of new product	176
3.6.2	Technical conditions for development and validation of new product	177
3.6.3	Information conditions for development and validation of new product	177

3.7	Evaluation the quality costs associated with development and validation of new product	178
3.8	Creation the database of experiences from development	178
3.9	Reference list of development worker	179
3.10	Safety of product	182
3.10.1	The principles of product liability	183
3.10.2	Procedures for recognition of manufacturing risks	184
3.10.3	Insurance of risks	184
3.10.4	Emergency plans and procedures	185
4	Monitoring, measuring and improving the process of development, production and validation of new product	186
4.1	Monitoring and measurement of process	186
4.2	Improving the process	187
5	Examples of product development and innovation from practice	187
5.1	Possibilities for using the tapered roller bearings	188
5.2	Some examples of development and innovation	189
5.2.1	Bearings in the execution Q	189
5.2.2	Bearings in the execution CL7	191
5.2.3	Bearings with the reduced preload of cage J2	193
5.2.4	Pair of bearings with spacer and circlip ring	194
5.3	Constructional – technological optimization of bearings in the recent period	195
6	Conclusion	200
7	References	207
8	List of annexes and forms	214