

TOMSK POLYTECHNIC UNIVERSITY

APPROVED

Director NDT

_____ V.N. Borikov

« ___ » _____ 2015 г.

ACADEMIC DISCIPLINE CURRICULUM

MEANS AND METHODS FOR QUALITY MANAGEMENT

DIRECTION BEP: **27.04.02 QUALITY MANAGEMENT**

PROFILE TRAINING: **Quality Management for Manufacturing Systems**

QUALIFICATION (DEGREE): MASTER

CORE CURRICULUM ENROLLMENT 2015 г.

COURSE 2; SEMESTER 3

CREDIT QUANTATY: 4

PRE REQUISITES: « Balanced Indicators System»

CORREQUISITE: «Risk Analysis»

TYPES OF EDUCATIONAL ACTIVITY AND TEMPORARY RESOURCE:

LECTURES 8 hours (class)

LABORATORY CLASSES - hours (class)

PRACTICAL CLASSES 40 hours (class)

CLASSES **48 hours**

SELF STUDY WORK **80 hours**

TOTAL **128 hours**

EDUCATION FORM Full-time

TYPE OF INTERMEDIATE ASSESMENT: Credit 3 semester

PROVIDING DEPARTMENT: Physical Methods of Non-Destructive Testing

DEPARTMENT HEAD: Dsc., professor A.P. Surzhikov

SUPERVISOR BEP: Dsc., professor A.P. Surzhikov

TEACHER: A.Prof., Phd I.V. Plotnikova

2015 г.

1. Objectives of mastering the discipline

The graduate student gets knowledge, skills providing the achievement of the objectives of the main educational curriculum “Quality Management” within the learning the discipline.

The graduate student studied the course “Means and Methods for Quality Management” has to possess:

- comprehension, functions and methods for quality management;
- mechanism for quality management and its elements;
- instruments for quality management.

Subject targets “Means and Methods for Quality Management” achieved by means of learning package:

- to possess academic knowledge in the sphere of quality management;
- to possess the skill to formulate the conception of methods and instruments for providing planning the quality depending on the specific character of the object;

The discipline is aimed to training the graduate students for solving managerial, technical, scientific tasks for quality management.

2. The discipline role in the structure BEP

The discipline refers to professional disciplines. It is connected with the disciplines of general scientific cycle (economics of quality) and professional cycle (structuring of the quality function) and based on the mastered knowledge and skills in learning these disciplines. The discipline pre requisites are “« Balanced Indicators System”, «Sectorial and Integrated Systems of Management Quality». Corequisites is the discipline “Risk Analysis”.

3. Results of mastering discipline

In studying the discipline the graduate student has to apply modern means and methods of quality management for the company of every sphere activity.

After studying the discipline the graduate students acquire knowledge, skills and experience corresponding to the results of the basic educational program

Result Code (graduate student has to be ready to show)
The ability to set up and solve innovative tasks, connected with the creation of new systems and methods of quality management, estimate economic efficiency of the processes, to adopt decisions based on the economical analysis.
The ability to provide theoretical and experimental research in the sphere of production quality management, processes and systems, the creation of new processes and systems of quality management at complex and undetermined conditions.
The ability to learn and improve the qualification individually within the period of professional activity, to find the necessary literature, data base, information, to follow basic requirements of informational safety.

Results correspondence for mastering discipline «Means and Methods for Quality Management» developed by competence BEP presented in the table.

Results of mastering discipline
<p><i>As a result of the development of the discipline the graduate student has to know:</i></p> <ul style="list-style-type: none"> • means and methods for quality management; • the purpose and principles of application quality; • the advanced domestic and global experience of the quality management; • discipline terminology for practical use in further professional activity; • the options of different computer programs for quality management.
<p><i>As a result of the development of the discipline the graduate student has to be able to:</i></p> <ul style="list-style-type: none"> • using the theoretical fundamentals and modern practice of the quality management; • to process analysis results and risks evaluations, using them in the work in taking management solutions and understand, • applying computer programs for management systems, • development standard management quality, and documentation.
<p><i>As a result of the development of the discipline the graduate student has to possess:</i></p> <ul style="list-style-type: none"> • practical skills of applying means and methods of quality management at the enterprise; • modeling and forecasting the development the risk situations; • work skills with the special software.

*Result code decryption of the education and forming competences presented in the basic educational program for training bachelors of direction 221400 “Quality Management”

4. Structure and content of the discipline

4.1 Content of the discipline sections

Section 1. Quality and competitiveness.

Introduction. Goals and objectives of the discipline mastering. Quality as the object of managing. Functional model of management evaluation. Quality as a constituent element of competitiveness. Competitiveness evaluation.

Section2. Methods of management quality. Quality types.

Methods of management quality. Management and quality evaluation. Method classification of quality management. New methods of quality management.

Section 3. Instruments and technology of quality management

Instrument of quality management. Technology development quality function. Affinity diagram. Connections diagram. Tree-like diagram. Matrix diagram. Development technology of quality function FMEA – analysis. Functional and cost analysis.

Section 4. Personnel motivation and consumers satisfaction

Motivation methods and factors. Orientation policy for client. Loyalty and consumers satisfaction. Consumer satisfaction index. Personnel motivation as an instrument of quality management. Orientation policy for client. Product importance for consumer. Consumers satisfaction. Consumer index satisfaction. Information analysis method of consumer. Development rules achievement for consumer satisfaction for enterprises.

4.2. Discipline structure in sections, organizational form and educational management

The structure of the discipline in sections and forms of organization of education

Table 2

#	Section name	Class work (hour)			Self-study work (hour)	Test	Total	Current assessment test
		lecture	practice./ seminar	Lab.				
1	Quality and competitiveness.	2	4	-	10	-	32	Essay
2	Quality management methods. Management types.	2	6	-	10	10	32	Test
3	Instruments and technologies of quality management	2	18	-	10	20	32	Essay Test
4	Personnel motivation and consumer satisfaction	2	12	-	10	10	32	Essay, Course work defence
	Total	8	40	-	40	80	128	Credit

At delivery reports the oral interview conducted.

The content of the practical section of discipline

4.3.1. Subject of practical lessons (40 hours)

1. Competiveness evaluation. Functional model of management estimation (4 h.)
2. Method classification of quality management. New methods of quality management. (2 h.)
3. Ways of product presenting for test. Level evaluation of product quality. (4 h.)
4. Development technology of quality function. (2 h.)

5. Affinity diagram. Connections diagram. Tree-like diagram. Matrix diagram (8 h.)
6. Development technology of quality function. (4 h.)
7. Functional and cost analysis. (2 h.)
8. Balanced Indicators System. (2 h.)
9. Personnel motivation as an instrument of quality management. (2 h.)
10. Orientation policy for client. Product importance for consumer. (2 h.)
11. Consumer satisfaction. Consumer index satisfaction. (2 h.)
12. Information analysis method of consumer. Composition and analysis questionnaire Kano. (2 h.)
13. Development rules achievement for consumer satisfaction for enterprises. (4 h.)

4.2 Competence distribution on discipline sections

Planned educational results on basic educational program, formed at the range of the given discipline presented in table 3

Table 3

№	Formed competencies	Discipline sections			
		1	2	3	4
1.	3.2.1	x	x	x	x
2.	3.2.3			x	x
3.	3.4.2		x	x	x
4.	3.5.2		x	x	x
5.	3.10.1			x	x
6.	Y.2.1			x	x
7.	Y.5.3		x		
8.	Y.10.1		x		x
9.	B.2.1		x	x	x
10.	B.5.2		x	x	x
11.	B.10.1			x	x

5 Educational technologies

In mastering the discipline the following types of study work with methods and forms of cognitive activation activity of graduate students at achieving planned educational results and competence forming used.

Methods and forms for activation activity	Lab work	Practice	Self-study
Discussion	x	x	
IT-methods	x		x
Team work		x	x
Advanced self-study	x	x	x
Individual learning		x	x
Problematic learning	x	x	x
Learning based on experience	x	x	

To achieve the discipline objectives of teaching the following means, techniques and organizational measures used:

- study theoretical discipline material at lectures by means of computer technologies;
- self-study learning of discipline theoretical material with the use Internet-resources, data base, methodological books, educational and scientific literature;
- enhance theoretical material in doing the laboratory works with the use of educational and scientific equipment and devices, providing problem-oriented, searching, creative tasks

6. Organization and training and methodological support self-study work of students

6.1 Current and advanced self-study, aimed for deepening and consolidation knowledge, and for practical skills development are:

- student's work with the lecture material, search and analysis of literature and electronic information resources of the given issue,
- carrying out of home assignments,
- drawing up structure-logical schemes on the theme course;
- compiling personal portfolio on educational subject;
- carrying out creative project-oriented assignments with the use IT;
- compiling terminological, topical vocabulary.
- material choice and conducting real-time and virtual topical excursions;
- compiling and solving case-study materials;
- test preparation.

6.2 Creative problem-oriented self-study work

aimed for intellectual skills development, complex of (universal) and professional competences, enhance student creative ability are:

- search, analysis, structure and presentation of information;
- analysis statistic and real-time materials on the specified scientific and applied problem;
- public delivery speech preparation for information environment;
- compiling and solving case-study assignments on interpersonal relations in business environment;
- research study and participation in scientific student conferences, seminars and olympiads.

Course paper «Means and Methods of Quality Management» (40 h s.s. w/p).

Course paper aimed to mastering students quality management instruments for improving production.

In performing the course paper students improve obtained theoretical knowledge at study discipline «Means and Methods of Quality Management».

Course paper objectives are:

- consolidation knowledge and skills of students, obtained in studying special disciplines;
- skills development of self-study work;

- the ability to work with technical and reference literature and other information sources;
- practical appliance of theoretical knowledge in using methods of quality management.

The course paper allows to demonstrate creative skills, to acquire practical experience for solving engineer tasks , to enhance and consolidate theoretical material. The course paper covers 70-75% of theoretical lecture material, tutorials.

The course paper approximately consists of 35-50 pages (format A4).

Content and laboriousness of the course project

Section name of the course work	laboriousness hours	
	Self-study work	%
The goal statement and objective determination of the course paper. Overview of literary sources.	10	15
The model creation of the company activity (department) The substantiation of the choice approach and method of improvement quality depending on the object specification. The method choice and instrument of quality planning.	25	25
The work out the scheme variant for improving production quality	35	35
Feasibility study.	20	15
Summary performance and course paper	10	10
Total	40	100

6.3. Content self-study work of students on discipline

6.3.1 Topics for self-study work:

- «enrichment» personnel with the work as the factor for motivation to qualitative labour;
- theory of management knowledge;
- delegation of powers;
- reward methods at new approach of management personnel;
- principles of the policy change.
- change resistance as positive and negative factors;
- development KPI и BSC at the company.

6.3.2. Topics for individual assignments

1. Quality planning on the main stages of life cycle product.
2. The motivation role in quality management.
3. Methodological approaches to the estimation for the consumer satisfaction.
4. The role of statistical control at the enterprise.
5. Communication nets and their role at the institute.

6. Interconnection of quality functions.
7. Corporate culture of the company.

6.3.3. Topics for course papers

1. Strategic and operative objectives in the sphere of quality management.
2. The quality planning at the main stages of product life cycle.
3. Methodological fundamentals of quality management.
4. The use (one of the instrument quality) for improving the activity of the company.
5. The motivation role in quality management
6. Methodological approaches to the estimation for the consumer satisfaction.

6.4 Test of self-study work

The testing of the self-study work of students and the mastering quality of separate modules of discipline performed by means of:

- answers results for testing questions;
- assessment of academic progress of students according to the lecture attendance, the activity at the practical lessons.

6.5 Training and methodological support of student's self-study work

1. Federal law dated 27.12.2002 # 184 «About technical regulation».
2. Standard ISO/TS 16348-03. The Quality Planning of the Perspective Production and the Quality Program: reference manual.
3. GOST P ISO 9000-2008. Quality Management Systems. Basic Statements and dictionary.
4. GOST R ISO 9001-2008. Quality Management Systems. Requirements
5. GOST R ISO 9004-2001. Quality Management Systems. Recommendations for improving activity.

7. Means of current and final estimation quality of discipline mastering (Fund for assessment tools)

For current estimation quality mastering discipline and its separate modules the following means worked out and used:

- self-study home assignment,
- task complete set for improving theoretical material;
- the list of testing questions on separate themes and sections;
 - mutual reviewing the works by the students of each other,
- analysis of prepared information sources by the graduate students,
- oral test in performed upon the delivery individual assignments.

The current testing of quality mastering separate themes and discipline modules performed at the base of the rating system. The testing performed every month and within the semester. The material mastering quality estimated with the points in accordance to the rating – plan on the theoretical part.

The final academic assessment test (credit) performed at the end of the semester and estimated in points.

The total rating determined with the summing points of the current mark during the semester and points, obtained on the intermediate academic assessment test at the end of the semester according to the results of the credit.

Maximum point of the current test is 60, intermediate academic assessment test (credit) – 40; maximum total rating is 100 points.

Mark «excellent» (A+(10) corresponds 93-100 points; «excellent» A(9) – 85-92; «good» B+(8) – 78-84; «good» B(7) – 70-77; «satisfactory» C+(6) – 63-69; «satisfactory» C(5) – 55-62; < 55 – «unsatisfactory(0); «credit» – 55-100.

7. Rating discipline quality mastering

weeks	Current testing							
	Theoretical material			Practical activity				total
	sections	ques- tions	points	goals	assign- ments	prob- lems	poi nts	point s
1-4	Quality and competitiveness						15	15
5-8	Quality management methods. Types of testing			T.P. 1				
9-12	Instruments and technologies of quality management			T.P. 2				
12-16	Personnel motivation and consumers satisfaction						45	45
The sum of points in semester				25	35		60	60

7.2. Requirements to the content of the credit

Examination card includes two types of tasks:

1. Theoretical question.
2. Creative problem - oriented task.

7.3. Questions

1. The organizational structure and the role of leadership in the implementation of quality.
2. IT for quality management.
3. The method of control charts and boundaries of its application.
4. Models of quality costs.
5. Basic direction of teaching in the sphere of quality management.
6. Modeling of Pareto diagram as a method of quality management.

7. Use of IT under implementation of TQM.
8. Isikava diagram, as a method of quality management at the example of the company.
9. Modeling of cause-effect diagram.
10. Development of methods for the quantitative evaluation of activities in the sphere of quality.
11. Company structure, labor division, necessity of coordination.
12. Basic stages of conducting FMEA – analysis.
13. What is value analysis and what principles is it based on?
14. What is the goal of BSC? What are its components?
15. Testing scales and boundaries of its application.
16. Diagram affinity.
17. Tree-like diagrams.
18. Histograms and their application at the company.
19. Delegation of authority.
20. Basic elements of quality system, recommended by ISO 9000.
21. Use of Pareto chart in QC.
22. Stability flow control by statistical methods.
23. Analysis of the processes precision (repeatability) by statistical methods.
24. Providing product output of the established quality by methods of technical control.
25. Methods to assess the work quality.
26. Staff motivation and encouragement.
27. Methods to control products reliability.
28. Economic methods in quality management. Estimating quality costs.
29. Methods of staff training to perform tasks in quality.
- 30.. Methods to inspect the system operation quality.

8. Information, training and methodological support of the discipline

Basic literature

1. [Monica Leba](#), [Andreea Cristina Ionica](#), [Eduard Edelhauser](#). QFD – Method for eLearning Systems Evaluation // [Procedia - Social and Behavioral Sciences](#), 2013–**Volume 83**, issue 4– Pages 357–361
2. [David A. Marca](#), [Clement L. McGowan](#). IDEF0 and SADT: A Modeler's Guide Paperback – OpenProcess, 2005 –392 p.
3. The Seven Management and Planning Tools– ASQ Quality Press, 2011–38p
4. [V.S.Bagad](#). Total Quality Management– Technical Publications, 2008–238p.
5. [Yoji Akao](#). Quality Function Deployment: Integrating Customer Requirements Into Product Design– Productivity Press, 2012– 300p
6. [Min Xie](#), [Thong Ngee Goh](#), [K. C. Tan](#). Advanced Qfd Applications– Amer Society for Quality, 2003–204p

7. [John Terninko](#). Step-by-step QFD: Customer-driven Product Design – CRC Press, 1997–2004p
8. [Chang W. Kang](#), [Paul H. Kvam](#). Basic Statistical Tools for Improving Quality– John Wiley & Sons, 2012–244p
9. [Ron Basu](#). Implementing Quality: A Practical Guide to Tools and Techniques : Enabling the Power of Operational Excellence– Cengage Learning EMEA, 2004–311

Supplementary literature

1. [Kuo-Cheng Ku](#), [Tsen-Chien Chen](#). A conceptual process-based reference model for collaboratively managing recreational scuba diving in Kenting National Park//[Marine Policy](#), 2013–[Volume 39](#) –P.1–10
2. [M. Benner](#), [A.R. Linnemann](#), [W.M.F. Jongen](#), [P. Folstar](#). Quality Function Deployment (QFD)—can it be used to develop food products?//[Food Quality and Preference](#). 2003–[Volume 14, Issue 4](#) –P.327–339
3. Yaoyao Zhao, [Xun Xu](#), [Tom Kramer](#), [Fred Proctor](#), [John Horst](#). Dimensional metrology interoperability and standardization in manufacturing systems//[Computer Standards & Interfaces](#), 2011–[Volume 33, Issue 6](#) –P. 541–555
4. [Chris Chen](#), [Hadley Roth](#). The Big Book of Six Sigma Training Games: Proven Ways to Teach Basic DMAIC Principles and Quality Improvement Tools (Big Book Series) Paperback– McGraw-Hill, 2004–250p.
5. [Chang W. Kang](#), [Paul H. Kvam](#). Basic Statistical Tools for Improving Quality– John Wiley & Sons, 2012–244p
6. [Stephen H. Kan](#). Metrics and Models in Software Quality Engineering– Addison-Wesley Professional, 2003– 528p.

Internet resources:

- <http://www.ria-stk.ru/> - AIA «Standards and Quality»
- <http://quality.eup.ru> - site on the quality management.
- <http://deming.ru/> - Deming Association
- <http://www.leanzone.ru/> - LeanZone.ru - open portal about lean manufacturing, community of lean manufacturing practitioners.
- <http://quality.eup.ru/forum/> - forum on quality management
- <http://www.iso.org/> - International Standardization Organization (ISO)

Attachment 1 – Rating-plan of mastering discipline during semester

Discipline	<i>Means and methods of quality management</i>	Number of weeks	18
Institute	<i>Institute of Non-Destructive Testing</i>	Number of credits	4
Department	<i>Department of Physical Methods of Non-Destructive Testing</i>	Lectures, hour	8
Semester	3	Practical classes, hour	40
Group	<i>IFM50</i>	Laboratory works, hour.	-
Teacher	<i>Plotnikova Inna Vasilyevna</i>	Total class work, hour	48
		Self-study work, hour	80
		Total, hour	128

Rating-plan of mastering discipline during semester

wks	Current testing							Total
	Theoretical material			Practical activity				
	Lecture topics	Testing materials.*	Points*	Names of laboratory works*	Points	Names of practical works	Points	Points
1-2	Quality and competitiveness.	Essay	2			Качество как составляющий элемент конкурентоспособности.	5	7
3-4	Methods of quality management. Types of testing.	Summary	2			Evaluation of competitiveness.	5	7
5-6	Instruments and technologies of quality management	Summary	2			Classification methods of quality management.	5	7
7-8	Personnel motivation and consumers satisfaction удовлетворение потребителей	Presentation	2			New methods of quality management.	5	7
Total assessment of academic progress (assessment) № 1								28

9-10						Development technology of quality function. Matrix diagram	8	8	
13-14						Affinity diagram. Connections diagram. Tree-like diagram.	8	8	
15-16						Personnel motivation as an instrument of quality management. Orientation policy for client. Product value for consumer. Consumer satisfaction. Satisfaction index for consumer.	8	8	
17-18						Information analysis methods for consumer. Compiling and analysis of Kano questioner. Development of satisfaction achievement rules for consumer companies.	8	8	
Total assessment of academic progress (assessment) № 2								32	
Final current assessment								60	
Credit								40	
TOTAL								100	

9. Material technical support of discipline

The discipline mastering performed at educational laboratories of Institute Non-Destructive Testing.

To deliver lectures room 308-18 of the educational building is available, for conducting the practical classes room 308-18 of educational building is available. The class rooms equipped with modern presentation facilities, which allows delivering lectures and practical classes, and organizing intermediate report presentations, mini-conferences. Performance of self-study work students is possible at class room 310-18 of TPU educational building, and the TPU library computer class, supplied with the Internet access. In studying the discipline students can use video materials, study- aids (standards, technical standard documents).

The program compiled on the basis of Standard BEP TPU in accordance with the requirements FSES-2010, direction of training 221400 “Quality Management”, profile “Management Quality for Manufacturing Systems”

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The program was approved at the meeting of the department of PhM of NDT, INDT (Protocol № 29 of "27" April 2015).