

# Quality Engineering

Syllabus Number

1G305

Special Subjects

Elective 2 credit

AOKI, Akio

## 1. Course Description

The following contents will be learned.

- (1) Concept of system selection, parameter design, and tolerance design in quality engineering.
- (2) SN ratio and Kando (sensitivity) in Quality Engineering.
- (3) Design of experiments.
- (4) Orthogonal array and Analysis of Variance.
- (5) Case study in automobiles.

In this lesson, knowledge, techniques, and attitudes regarding DP 2, DP 3, DP 4, and DP 5 will be acquired.

Lessons are primarily lecture-style, but pair work will be carried out as appropriate according to the contents of the each lesson.

## 2. Course Objectives

Students can apply the function and robust design, and the SN ratio and Kando (sensitivity) used in quality engineering. And these factors' effect diagrams and variance analysis tables to specific cases in automobiles and the like.

## 3. Grading Policy

Your grade in the class will be decided on the evaluate with 100% of the result of the final exam. An explanation will be given after the end of the final exam.

## 4. Textbook and Reference

Textbook

TAGUCHI Genichi Quality engineering at development / design stage Japanese Standards Association

## 5. Requirements(Assignments)

- (1) As preparations for next lesson, please check the meaning of the proper noun and the contents of the relationship shown in the contents of lesson, and come to the class. (90 minutes)
- (2) As a review, please solve exercises applied to the items instructed during the lesson, so that you can cope with works in pair as appropriate in the next lesson. (90 minutes)

## 6. Note

Use a calculator with functions such as logarithm, average value, and standard deviation.

## 7. Schedule

- [1] Concept of parameter design and tolerance design in Quality Engineering and dispersion.
- [2] Basic function, purpose function, and measurement characteristic.
- [3] Control factors, error factors, signal factors, and inner and outer factors in quality engineering.
- [4] SN ratio and sensitivity of static characteristics.
- [5] SN ratio and sensitivity of dynamic characteristics.
- [6] Experiments with orthogonal (multiple placement and orthogonal array), the number of experiments, and exercises in pairs.
- [7] Inner and outer allocation of factors and the preparation of outer factors in multiple placement and orthogonal array.
- [8] Total variation, decomposition, and variance analysis of each variation.
- [9] Data analysis of two dimensional arrangement, factor effect diagram, and analysis of variance(ANOVA) analysis in two dimensions. Exercises in pairs.
- [10] Data analysis of orthogonal array L18 and exercises in pairs.
- [11] Data analysis of orthogonal array L18 and factor effect diagram.
- [12] Data analysis of orthogonal array L18 and variance analysis of orthogonal array L18. Exercises in pairs.
- [13] Orthogonal polynomial, least square method, and handling of missing value.
- [14] SN ratio, sensitivity of dynamic, and static characteristics.
- [15] Summary.