PROBLEM SOLVING AND PRODUCT PLANNING
BY QFD-TRIZ

Masahiro Hayashi
KYOWA CO., LTD.
CONTENTS

● Company overview
● Background and current state
● QFD-TRIZ
  ① Problem
  ② Problem
  ③ Solution
● Summary
COMPANY OVERVIEW

Corporate name: Kyowa Seikoh Ltd.
Foundation Date: July, 1966
The capital: 35 million yen
The number of whole employees: They are 91 business execution place people among 150 people.

Address

【headquarters factory】
〒399-3103 Nagano Prefecture Shimoina-gun Takamori-cho
Shimoichida 1514-1
TEL.0265-35-2421  FAX.0265-35-7788

【Yamabuki factory】
〒399-3101 Nagano Prefecture Shimoina-gun Takamori-cho
Yamabuki 1646-5
TEL.0265-35-8288  FAX.0265-35-8388
BRAKE
ブレーキ開発・製造

お客様に安心して使っていたくために、その作りの基本を追求し継承しています。その中には、私どもの真心も含まれています。

✓ 多品種・小ロット生産
✓ スピードをもったオーダーメイド開発と信頼性試験
✓ 組立ラインの自社開発設備
MANUFACTURE
精密部品加工
現状にせんじることなく、より良い品質を保証し、生産効率を追求し、改善し続けています。

- 試作納期：5日少量生産可能
- 設備・工事集約で低価格実現
- 仕上レスでの安定品質加工

ASSEMBLY
組立アセンブリ
お客様の希望を具体化する力、時代の流れを踏まえ、実現化する力があります。
そして、部品加工設備とプレーキで培った生産技術で、新たな分野にも挑戦します。

- 部品加工設備とプレーキで培った生産技術で
  一式請負可能
OEM production as the subcontract enterprise is a center, and the original development power is weak ... -.

It realizes the limitations in the traditional system though it aims at the development enterprise of the proposal type product depressed by another step.
BACKGROUND AND CURRENT STATE

It is not possible to get rid of the system of old development while the electromagnetic brake matter to the new field is increasing gradually and development has not advanced.

The inside and the idea Ltd. of such a situation introduced the systematic development technique of the proposal type product by coordinated application of QFD-TRIZ.

Then, it practiced while learning the systematic development technique for applying the development matter and QFD-TRIZ, and it worked.
Information on the matter that has already been gotten is enumerated.

Usage spread sheet

Quality table

It is worth starting development though there are a lot of problems, too.
DEVELOPMENT MATTER AND PROBLEM

- Chair for treatment used by otorhinolaryngology

【 present 】
① The locking device greatly obstructs doctor and the nurse’s operation.
② There will be a time lag by the time the maintenance mechanism operates.
③ The operation sound is large (It is long).

Maintenance mechanism
The spring mechanism of the axis lock is driven with the motor.
TARGET SETTING OF PROBLEM SOLUTION

The motor is driving the spring mechanism of the axis lock.
→ The structure becomes complex.
→ An obstructive projection part is included in treatment.

Use the electromagnetic brake, and an umbo to losing compact (first diameter)

Maintenance torque
I want to secure the maintenance torque equal with present.
Big problem

It is necessary to enlarge the brake greatly to invent a high torque by an existing method.

Hope from the customer is about $\Phi 50$. • • •

Existing $\Phi 50=4N\cdot m$

Ten times

The demand: $40\ \Phi 170$ corresponding $= N\cdot m$ with about $\phi 50$ • • •

An ..high torque.. electromagnetic brake is needed in the first diameter (space-saving).

Can this problem be solved with TRIZ? • • •
Flow of problem solution

• **Device analysis** *(Function-Attribute analysis)*
  
  It is useful, is harmful, the lack actions of each parts are subdivided, and it analyzes it.

• **Foundation cause analysis** *(cause-consequence analysis)*

• **Technical contradiction and physical contradiction**

• **Invention principle of 40**
  
  • 635 methods *(brain writing)*

  Compulsory idea putting out + grouping

• **Generation of uniting → concept of idea**
Invention principle of 40

To raise retentiivity
- : When you raise [odukichikara]
× : It becomes impossible to suck.

To raise the operating physical force
- : When you raise the suction power
× : Power consumption goes up.

To reduce the outside diameter
- : When you reduce the outside diameter
× : It rolls and it becomes few.

Contradiction · · · -
When the volume is earned to raise the suction power (The magneto motive force is raised), the length of the rolling line is needed.

2 : Separation principle
8: Balance principle
14: Curved surface principle
35: Parameter change principle
PROBLEM SOLUTION

Mechanism idea to achieve high torque

Existing Φ50=4N·m (friction board)

Development idea Φ55
=40N·m

It is high torque structural and is a mechanism. small

2 : Separation principle → The characteristic necessary for the object and the characteristic not slided are selected.
8 : Balance principle → The pushing force is counterbalanced by shape in pressing respect.
14 : Curved surface principle → Shape in pressing respect is enabled by using sphered principle.
35 : Parameter change principle → Physical of the object is changed. → The material is changed.
PROBLEM SOLUTION 2

The problem of the mechanism idea is a gap to liberate it.

Friction board gap = 0.2mm
Common material: S10C (Low carbon material near pure iron)

Old goods

Development goods gap = It is 0.5mm or more necessary.
A strong suction power that can suck the gap is necessary.
A strong core that generates the suction power is necessary.
It consults the steel material shop and another type of business person.

Application of exotic material
The problem is solved.

【Product designed by QFD-TRIZ】

①  It is compact in a simple structure.

②  The time lag when operating is lost and it operates instantaneously.
   It is movable and maintains it with ON・OFF instantaneously.

③  The operation sound is small (It is short).
RESULT AND SUMMARY

- Sales projections and the problem point are extracted by using QFD from the first stage.

- The problem is modeled and subdivided by the device analysis and the foundation cause analysis. It does and the true nature of the problem and the cause are analyzed.

- The problem of technical contradiction is solved by using TRIZ "Invention principle of 40".

Our company reviewed the old development flow, and was able to construct the mechanism of new development.

Thank you for listening.