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

株式会社 協和精工

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 e
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-ch yamabuki 1646-5

TEL.0265-35-8288　FAX.0265-35-8388

Certification of international standard ISO

ISO 9001
JIS Q 9001

JAB
CM004

エコアクション21

協和精工

BRAKE
ブレーキ開発・製造

お客様に安心して使っていただくために、ものづく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

Tamagawa TAMAGAWA SEIKI CO.,LTD. / YASKAWA Japan / 三鷹光器株式会社
Minebea Passion to Exceed Precision / IAI Quality and Innovation / YAMAHA

MANUFACTURE
精密部品加工

現状に甘んじることなく、より良い品質保証と生産効率を追求し、改善し続けています。

- ✓ 試作納期：5日少量生産可能
- ✓ 設備・工程集約で低価格実現
- ✓ 仕上レスでの安定高品質加工

東京エレクトロン　sysmex　株式会社ハーモニックドライブシステムズ

ASSEMBLY
組立アッセンブリ

お客様の希望を具体化する力、時代の旬を商品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

東京航空計器株式会社

株式会社 協和精工

Background and current state

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

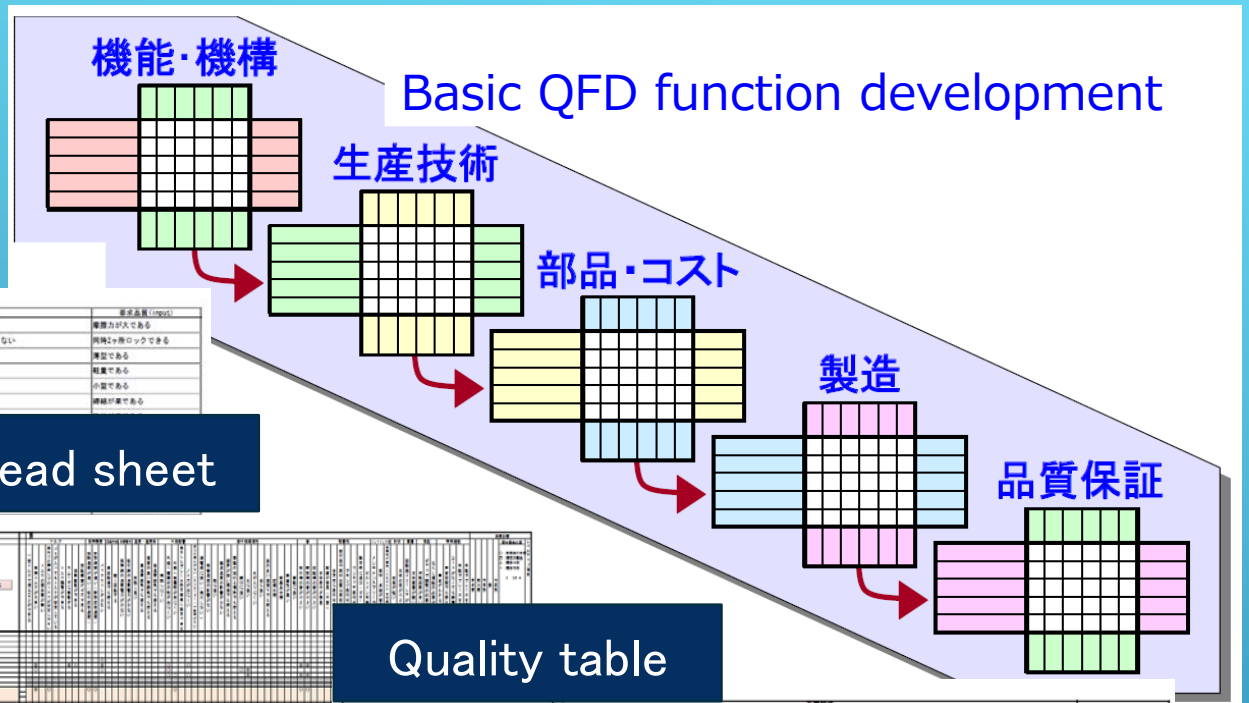
It is not possible to get rid of the system of old development while the electromagnetic brake matter to the new field is increasing gradually and development has not advanced.

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.

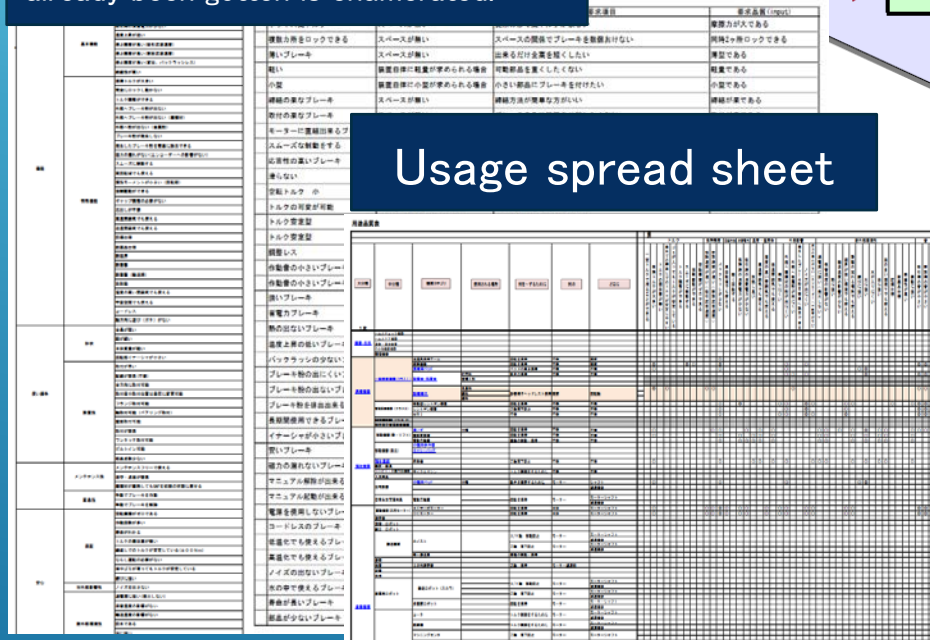
Our company QFD Quality project

Information on the matter that has already been gotten is enumerated.

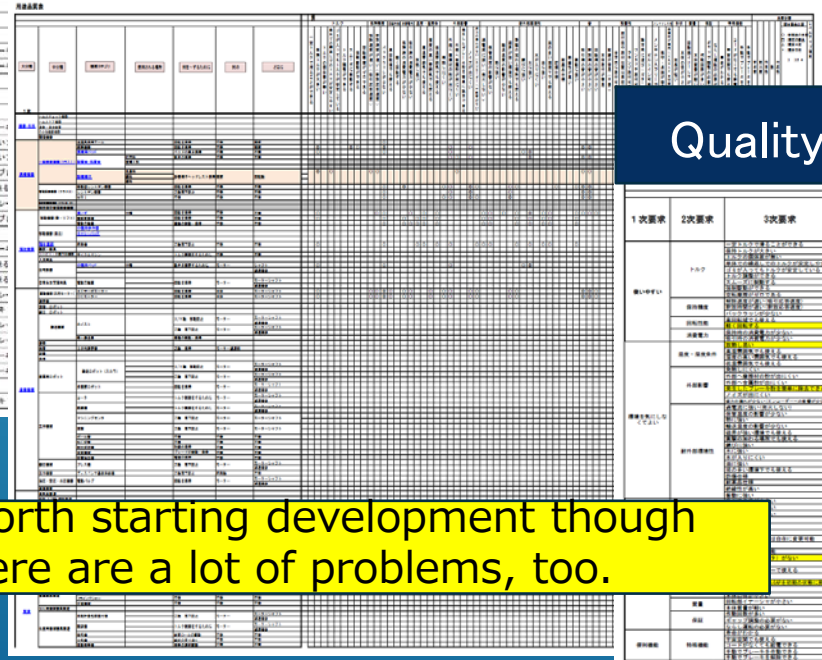


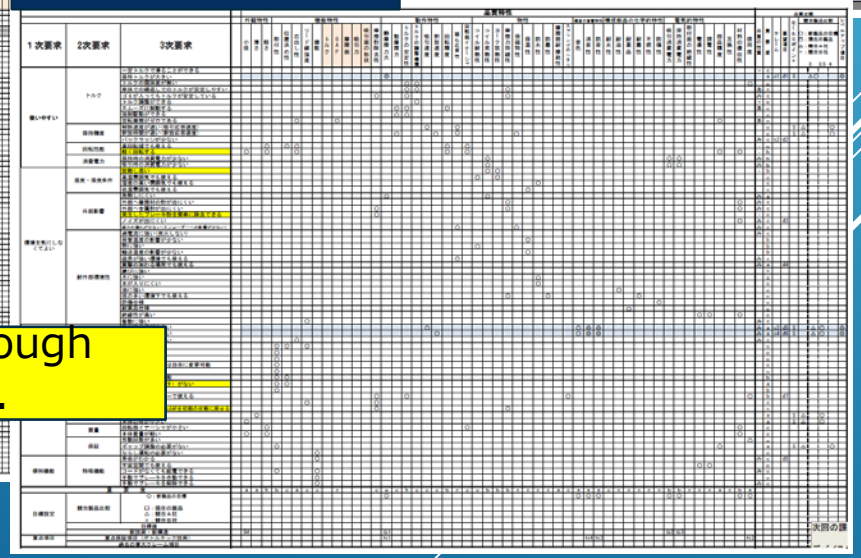
Basic QFD function development

Usage spread sheet



Quality table





It is worth starting development though there are a lot of problems, too.

株式会社 協和精工

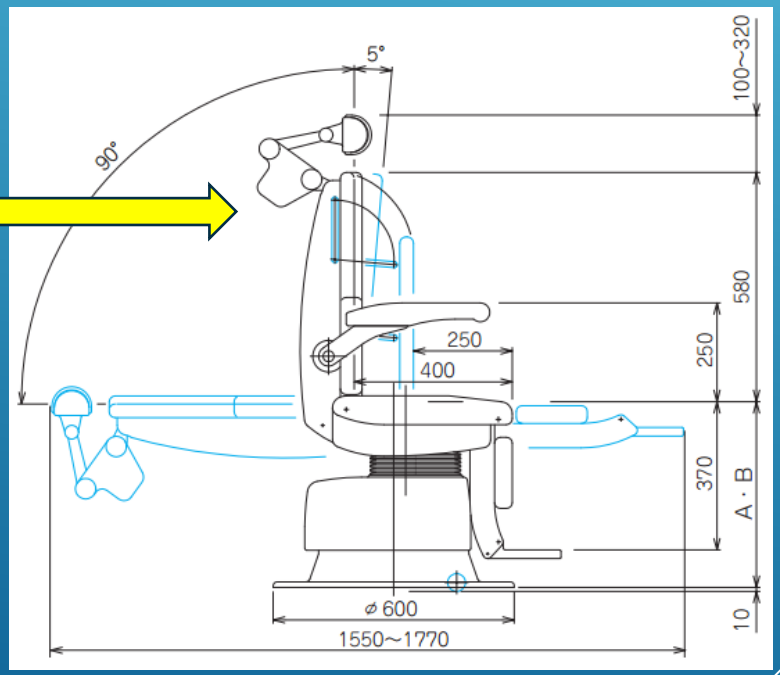
DEVELOPMENT MATTER AND PROBLEM

・Chair for treatment used by otorhinolaryngology

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

Maintenance mechanism

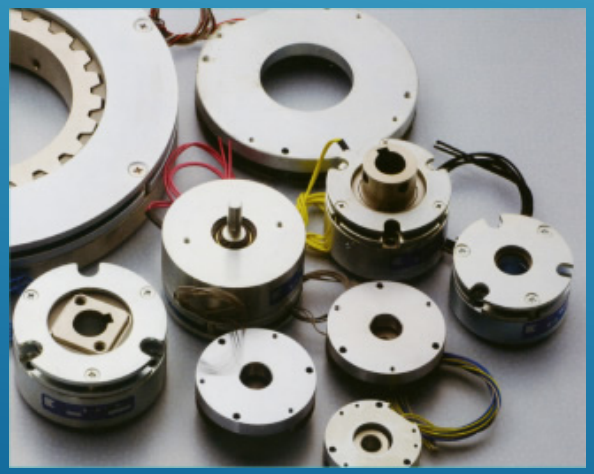
The spring mechanism of the axis lock is driven with the motor.



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.

株式会社 協和精工

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 Φ50. ・・・・

Existing Φ50=4N･m

Ten times

The demand : 40 Φ170 corresponding = N･m with about φ50 ・・.

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

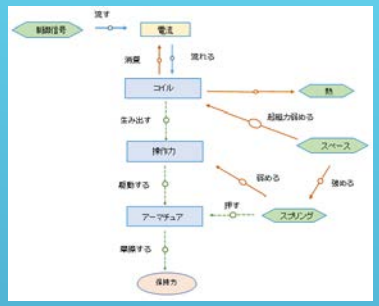
Can this problem be solved with TRIZ?・・・

株式会社 協和精工

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

株式会社 協和精工

Invention principle of 40

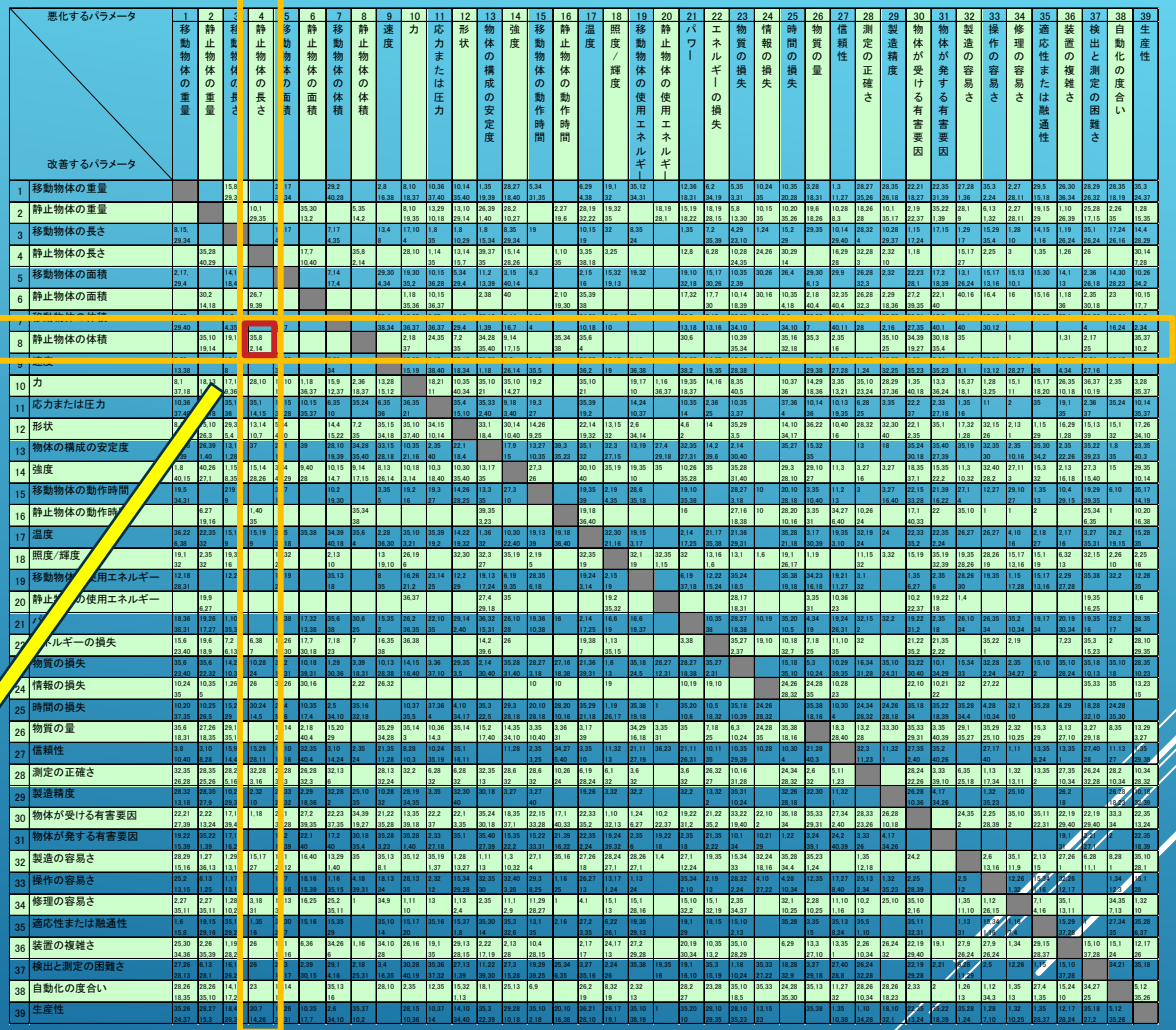
To raise retentivity
- :When you raise [odukichikara]
×:It becomes impossible to suck.

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

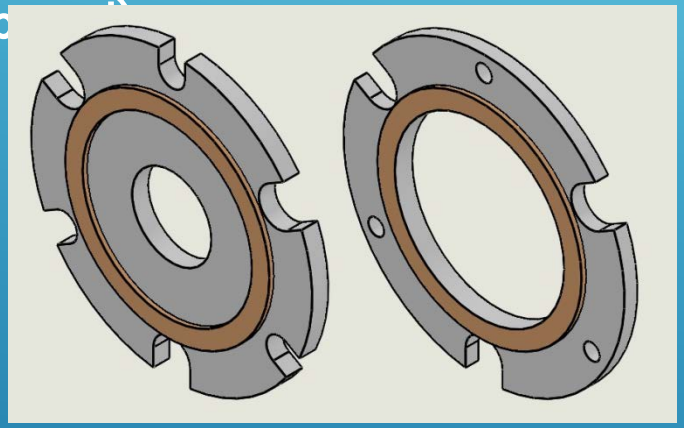


PROBLEM SOLUTION

（特許出願検討中）

Mechanism idea to achieve high torque

Existing Φ50=4N･m (friction b…



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. 。

株式会社 協和精工

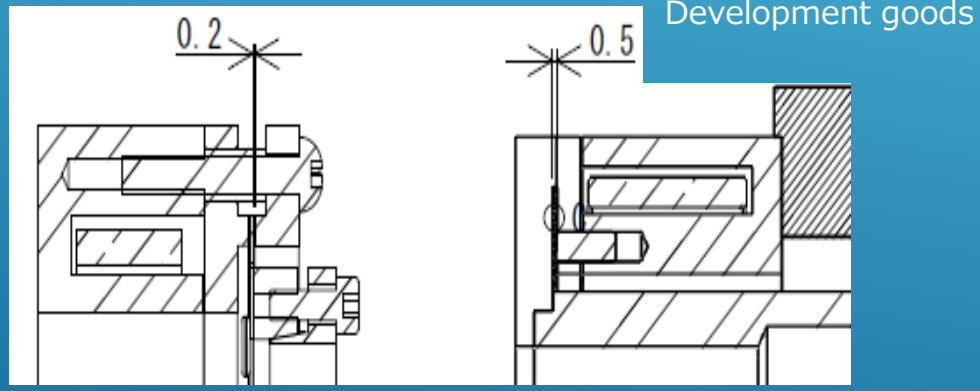
PROBLEM SOLUTION 2

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

Friction board gap＝0.2mm

Common materialS10C(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

株式会社 協和精工

The problem is solved.

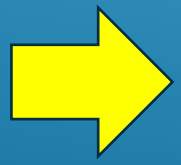
【Product designed by QFD-TRIZ】

① It is compact in a simple structure.

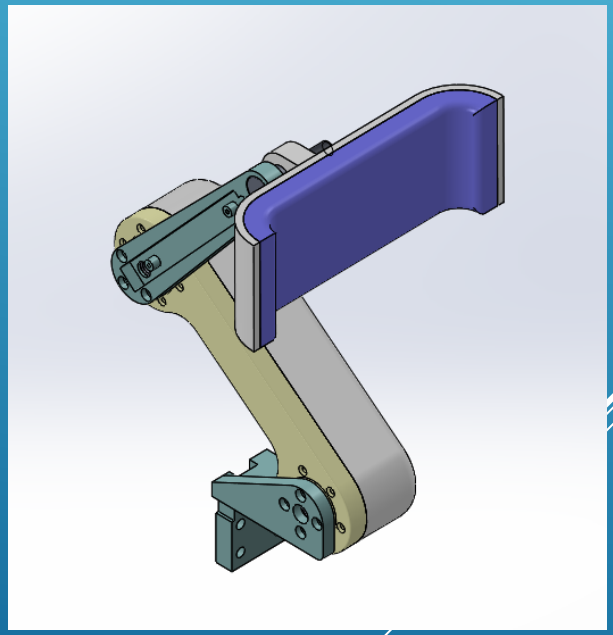
② The time lag when operating is lost and it operates instantaneously.

It is movable and maintains it with ON･OFF instantaneously.

③The operation sound is small (It is short).



Finished image



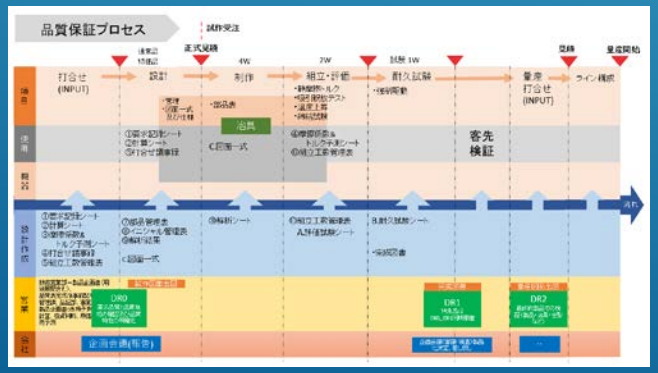
RESULT AND SUMMARY

・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.

株式会社 協和精工