IMPROVEMENT OF THE SCRATCH ON THE WIRE AT THE WIRE ROD ROLLING PROCESS

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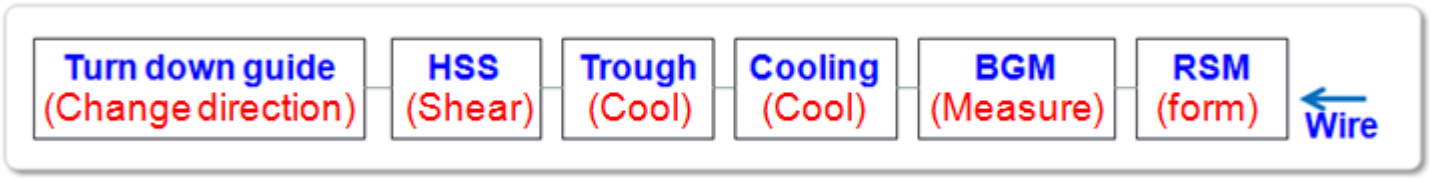
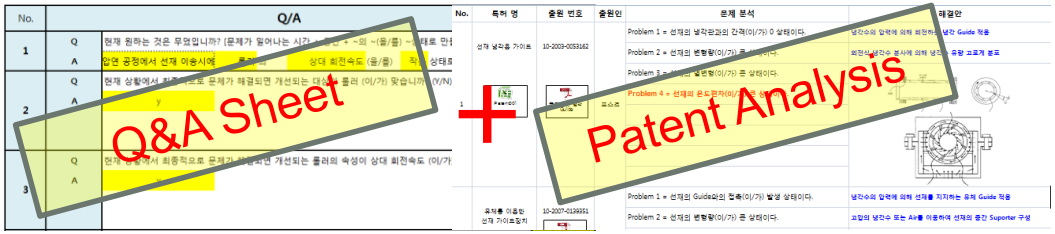
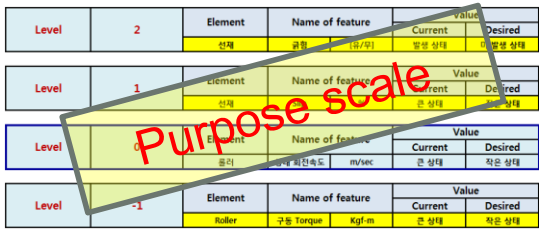
1. What is a Problem?

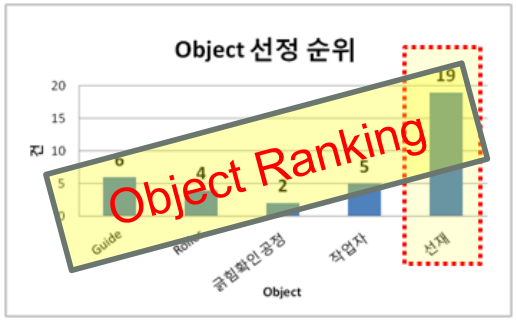
- Scratch is one of the main issue at the wire rolling process.

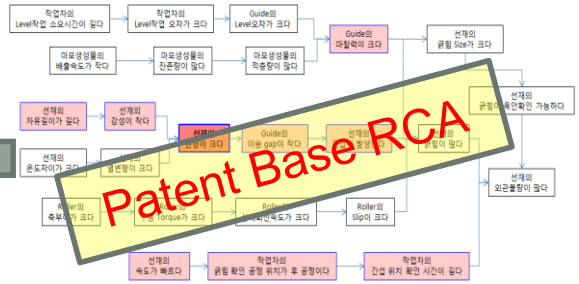


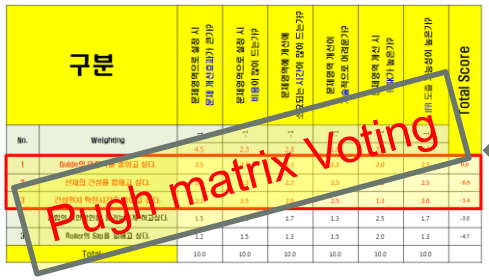
- Setting up of the problem list by using 'patent based RCA'





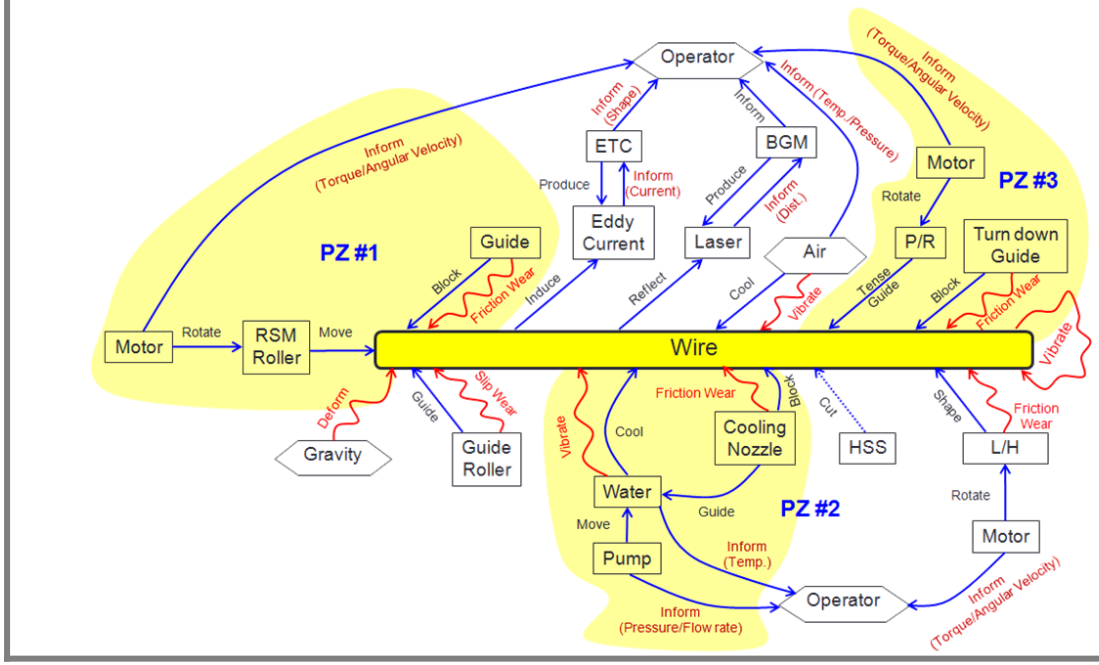
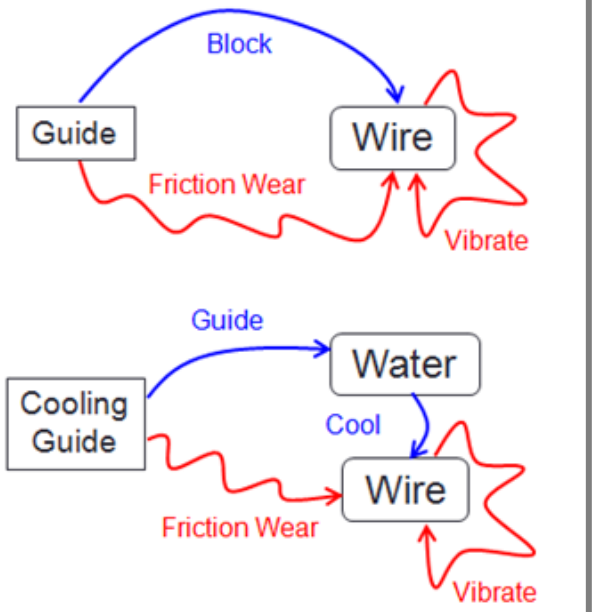




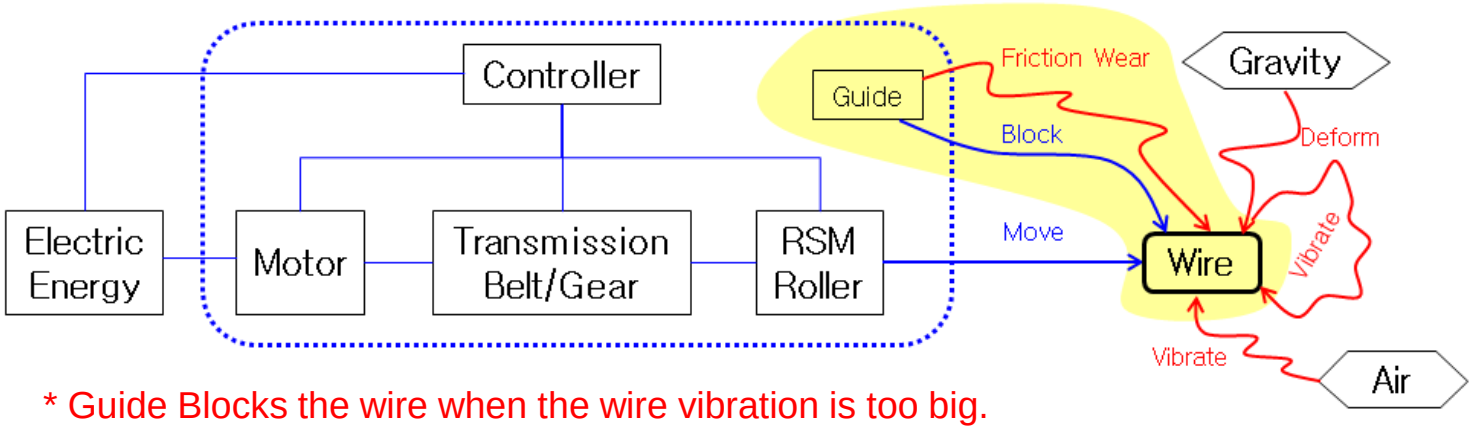


2. Problem Analysis

- Function analysis and core problem modeling
  - Implementation of the function analysis.
  - Definition of the problem zone based on the 'Patent based RCA'
  - Setting up the core problem list.

Function Analysis & Problem Zone	Core problem
	

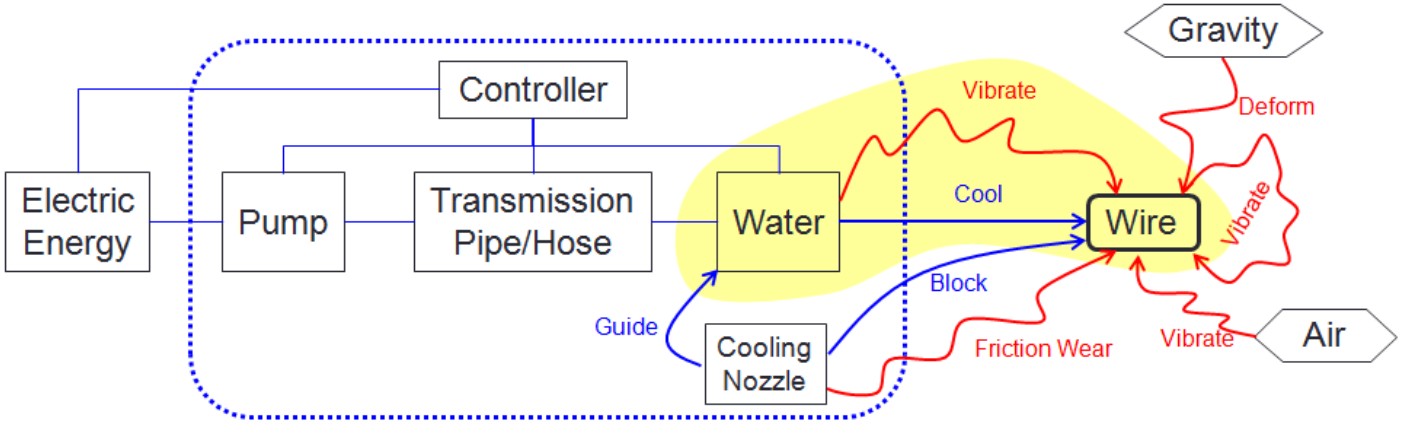
3. Contradiction Analysis (from core problem #1)



* Guide Blocks the wire when the wire vibration is too big.

Conflicting Pair #1	Object : Wire / Tool : Guide
Contradiction #1	Guide → Guide Gap ↓: Good: Vibration; Bad: Friction Wear Guide → Guide Gap ↑: Good: Friction Wear; Bad: Vibration
	Guide gap should be small for reducing wire vibration. **Guide gap should be big for reducing friction wear.**

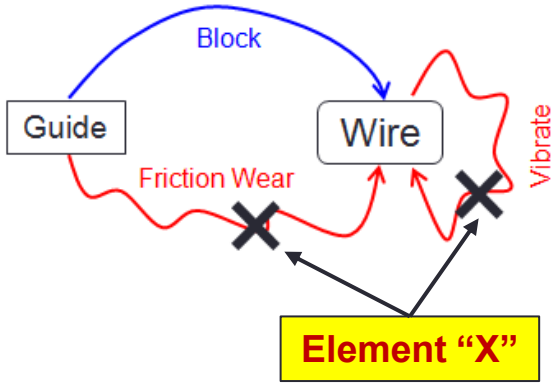
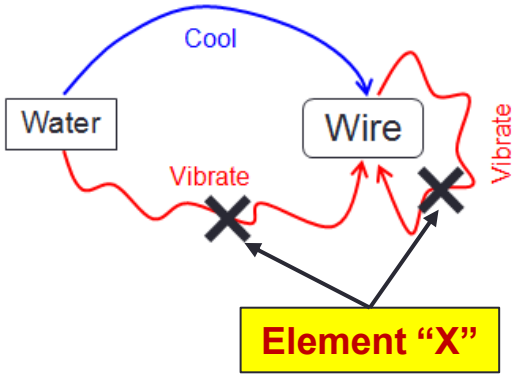
3. Contradiction Analysis (from core problem #2)



Conflicting Pair #2	Object : Wire / Tool : Water
Contradiction #2	Water — Flow rate ↑: Good: Cooling; Bad: Vibration Water — Flow rate ↓: Good: Vibration; Bad: Cooling
	Flow rate should be high for cooling wire reliably. **Flow rate should be low for reducing wire vibration.**

4. IFR study

- IFR study from the problem model.
  - Study on “x” element for reaching IFR.

Model	IFR
	1. “X” element preserve the ability of perfect blocking and provides protection against friction wear. **2. “X” element preserve the ability of perfect blocking and provides reduction of Wire vibration**
	1. “X” element preserve the ability of reliable cooling and provides reduction of excitation of the wire vibration. **2. “X” element preserve the ability of reliable cooling and provides reduction of Wire vibration**

5. Final solution

- Guide roller system integrated with vibration absorber
  - Introducing the Idea reducing wire scratch by reducing the vibration of the wire itself.

As-is	To-be