Sample Problems for the TRIZ Practitioner Certification Test

A. FUNCTION ANALYSIS

A-1.

- System to be analyzed: Film dispenser (Fig. 1).
- Challenge: Pulling the film out of the dispenser often causes it to tear. It is then necessary to open the box and readjust the film, which makes the product inconvenient for use.
- Project restrictions:
  - Film thickness should not be changed
  - Customer behavior should not be changed
- Build a function model of the system.

Fig. 1

Fig. 1.

A-2.

- Apply trimming to the film dispenser from the previous problem.
- Use the function model you have built.

B. RESOLVING CONFLICTS/CONTRADICTIONS

B-1.

- Rice dryers use heated air to remove moisture from wet rice before storage and shipping. Increasing air temperature boosts productivity but causes rice cracking (as well as plenty of dust). What can be done to improve the situation?

B-2.

- It is common practice to use water sprays to reduce dust levels in mining operations. For example, low pressure sprays or "foggers" are used with continuous mining machines to protect the machine operators from dust generated by the action of the mining machines. The smaller the droplets, the better they catch dust. But small droplets are light and can be easily carried away by the air currents. Bigger, heavier drops are not influenced by the air as much, but they do not catch dust well. What can be done to improve the situation?

C. SUFIELD ANALYSIS

C-1.

- Hydraulic mining is a form of mining that uses high-pressure jets of water to dislodge rock material or move sediment.http://en.wikipedia.org/wiki/Hydraulic_mining - cite_note-0 Use the Standards to suggest ways to increase the effectiveness of this technology.

C-2.

- Dirt often sticks to the inner surface of the excavator bucket during unloading, which is undesirable (Fig. 2). Suggest a simple and cost-effective method for eliminating this disadvantage.

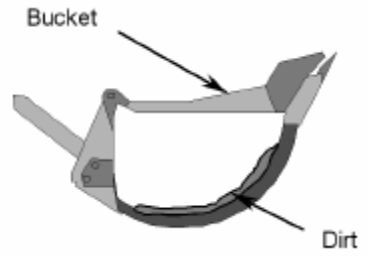


Fig. 2.

D. ARIZ

D-1.

- The robot gripper is powered by two air lines made from hard Nylon (Fig. 3). One air line powers the gripper fingers, the other powers a pneumatic motor that rotates the gripper. The lines are firmly attached to the top of the quill and to the gripper, which rotates ± 270^0. Rotation of the gripper causes a twisting of the Nylon tubes, which results in a high and varying torsional resistance to the gripper motion and, consequently, in less positioning accuracy. Softer PVC tubes exhibit fast fatigue failures at their attachments to the grippers.

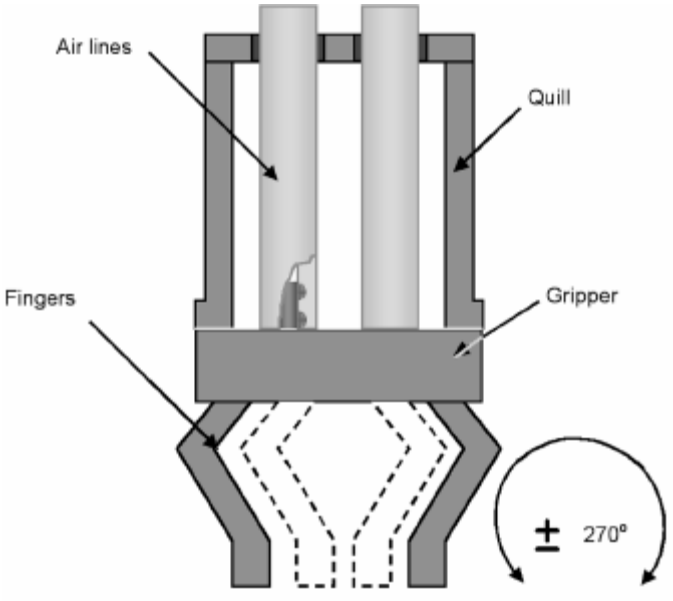


Fig. 3.

D-2.

- Fabrication of seamless tubes is performed on a skew roll piercing mill (Fig. 4). A hot billet is fed by skewed rollers onto the stationary mandrel. The rollers compress the billet, which results in developing discontinuity and opening near the axis of the billet body. The mandrel tip expands the opening and calibrates it. The mandrel may be misaligned by the radial forces exerted by the billet due to its imperfect symmetry, and this leads to non-uniformity of the tube wall thickness. Process control systems can improve the situation, but they are costly.

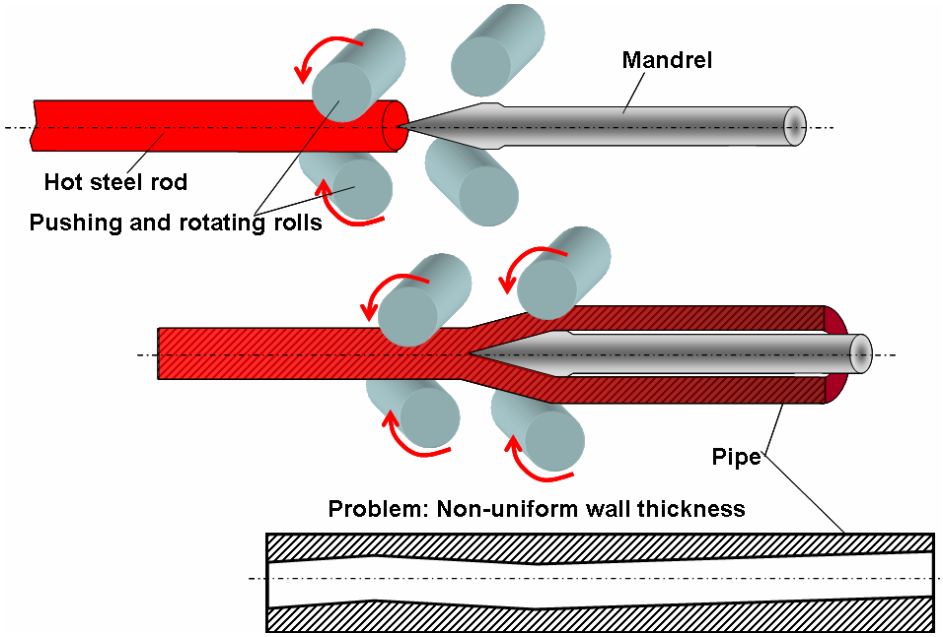


Fig. 4.

E. LAWS LINES OF SYSTEM EVOLUTION

E-1.

- Apply any of the three lines of increasing flexibility below (Figs. 5a,-5c) to any consumer product of your choosing. Describe the resultant concepts and/or design challenges (conflicts/contradictions) that need to be overcome to realize these concepts.

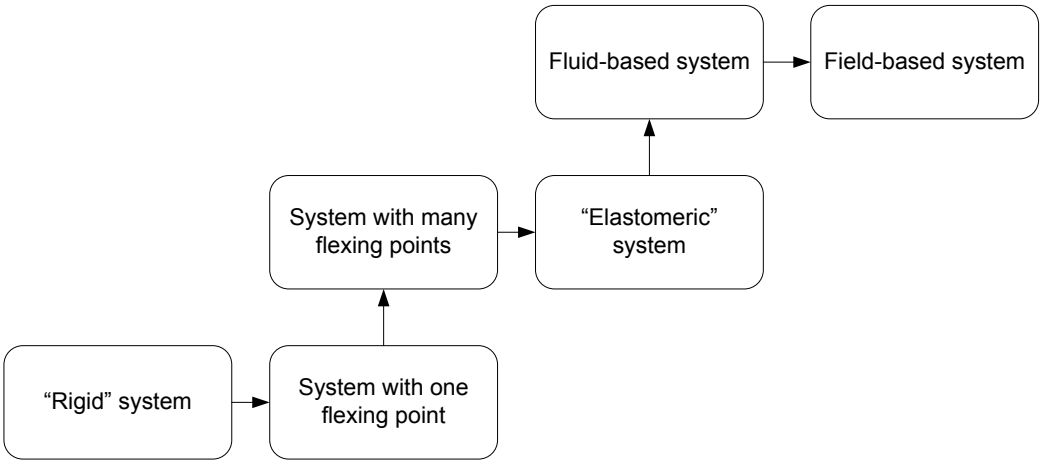


Fig. 5a.

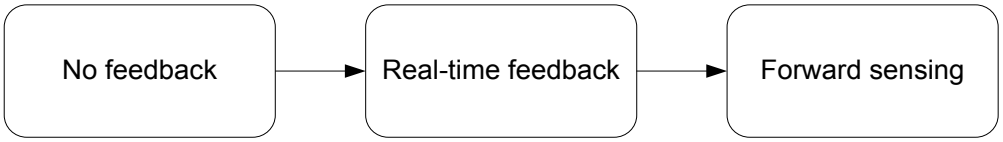


Fig. 5b.

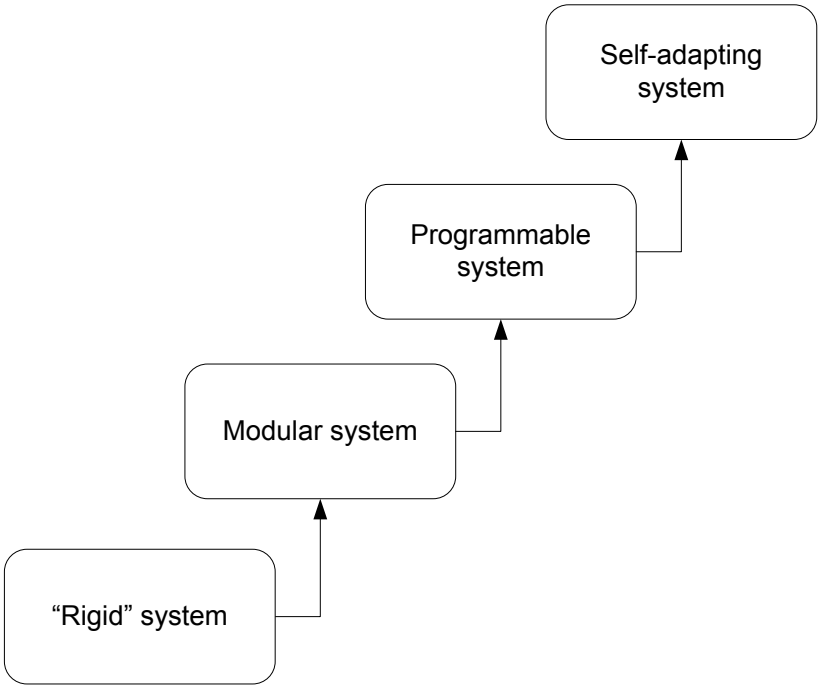
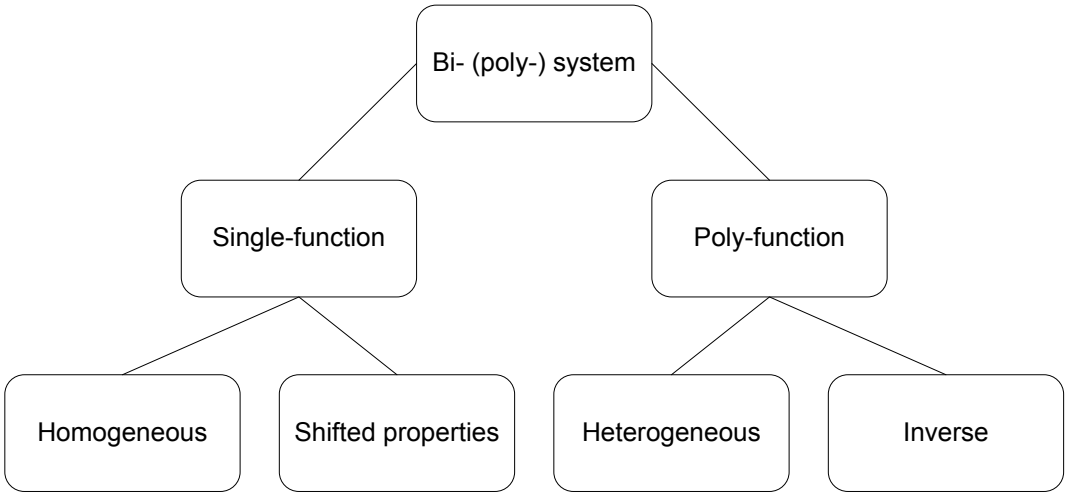


Fig. 5c.

E-2.

- Apply the lines of mono-bi-poly (Fig. 6) to any consumer product of your choosing. Describe the resultant concepts and/or design challenges that need to be overcome to realize these concepts.



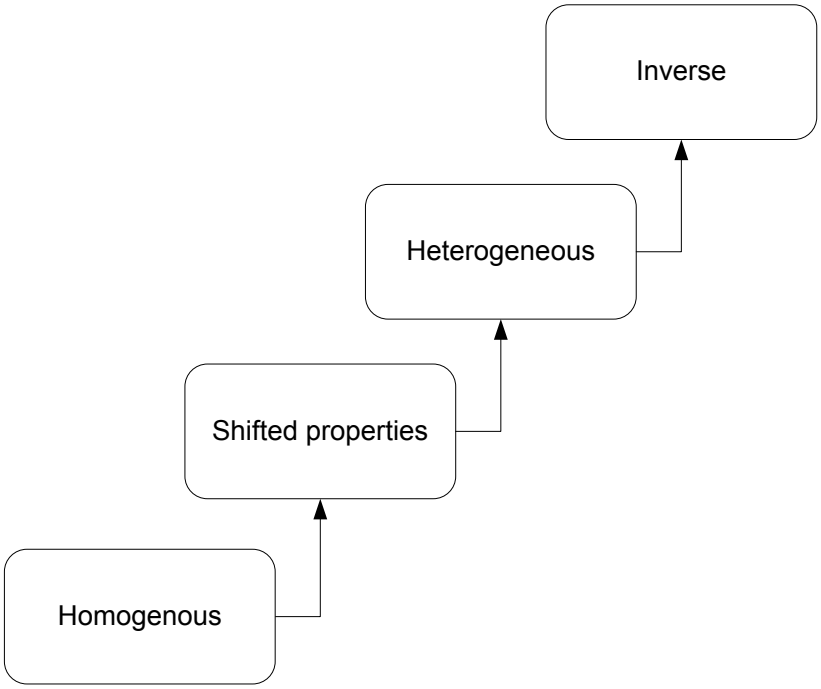


Fig. 6.