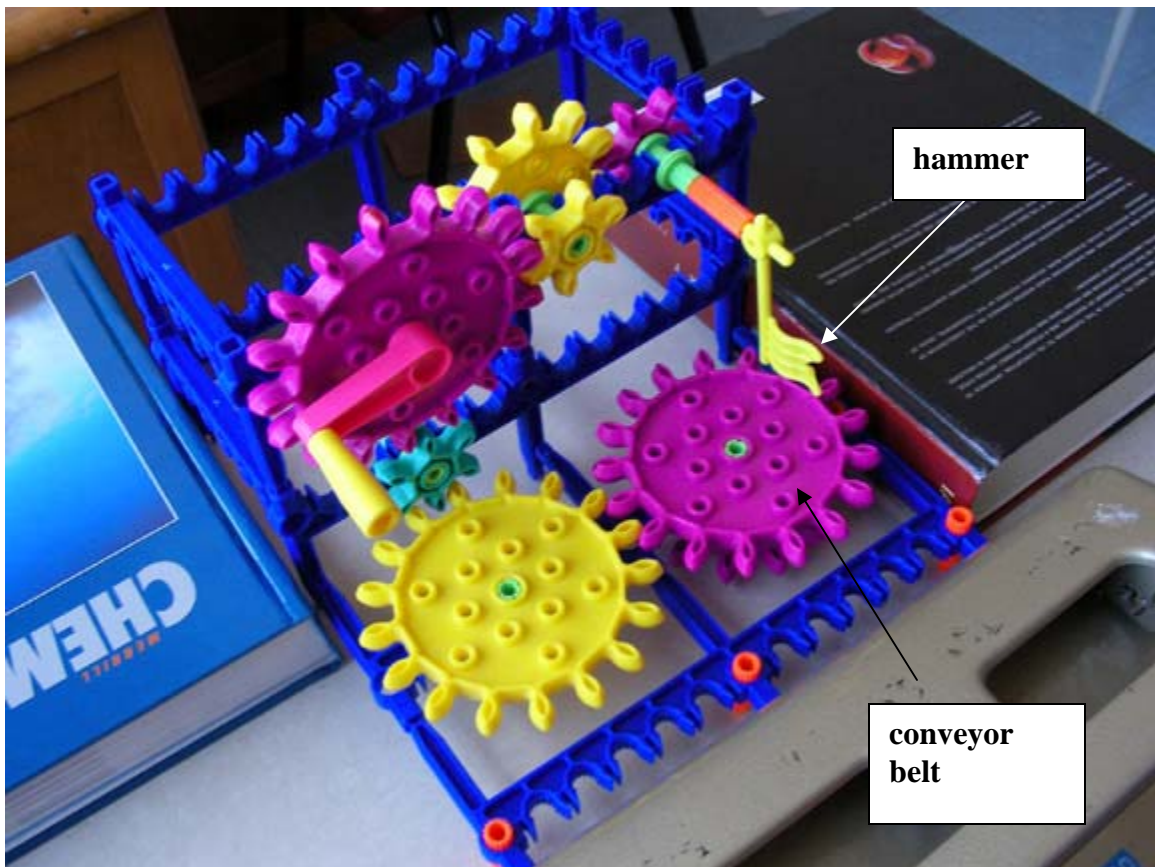


Learning Activity 3:      Simple Building Project Involving Gears

1.    **Problem:**    Create a model of an assembly line. This is what the assembly line should do:
  - (1) Little nails on plates have to be nailed in several places. (Nailing does not have to actually take place in model; in fact, you don't have to show the individual plates either).
  - (2) The plates are fixed on a rotating conveyor belt.
  - (3) Because each plate needs more than one nail, the hammer has to rotate faster than the conveyor belt.
  - (4) Not to waste energy, the system has to be as efficient as possible, meaning that the least number of gears have to be powered (in reality by a motor—in the model it will be manually powering by at least 1 handle).
  - (5) Here is an example of a model built with slightly different materials than the ones made available to you.



## 2. REPORT

### A. DATA

- a. For every turn of the input gear, count the number of turns made by the gear connected to the hammer.
- b. For every turn of the input gear, count the number of turns made by the gear acting as the conveyor belt.
- c. Compare the direction of the motion of the output gears to that of the input gear. Also note whether the motion occurs in the same plane.

Summarize the data in a table.

- d. Produce a technical drawing of your assembly line.

### B. ANALYSIS

- a. *By counting the teeth on the gears*, calculate the gear(velocity) ratio for the output gear connected to the hammer and for the one acting as a conveyor belt.
- b. *By counting the teeth on the gears*, calculate the gear ratio for the output acting as a conveyor belt.
- c. How do your results in (a) and (b) compare to the data you obtained by counting turns?
- d. How many handles had to be turned to operate the entire system? Why is this important?

### C. CONCLUSION

In your conclusion, briefly summarize what you assembled and mention what you learned by comparing gear ratios to the number of turns. Finally, comment on the efficiency of your assembly line.