



# Young Scientist Lab

Discovery  
EDUCATION

3M

## WHELMERS

### Salt Engineering

Salt crystals demonstrate how forces can be directed in mechanical systems.



### WHAT YOU NEED

- ruler
- cardboard tube, such as a wax paper, plastic wrap, or aluminum foil tube
- tissue paper or wax paper
- rubber bands or masking tape
- table salt—enough to fill the tube half full
- 1-inch wooden dowel or broomstick

## WHAT YOU DO

1. Using a ruler, cut tissue or wax paper into 6" x 6" squares.
2. Use rubber bands or tape to attach the paper over one end of the cardboard tube, creating what looks like a drumhead.
3. Push the broomstick through the tube so it bursts through the paper cover. Pretty easy, huh?
4. Now, remove the damaged paper and replace it with a fresh piece.
5. Before you try again, pour salt into the tube to a depth of about 3 inches. The wax paper should hold the salt in the tube.
6. Hold the open end of the tube straight up, and try again to burst the paper by pushing the broomstick through the surface of the salt. Not so easy anymore, is it?

## WHAT HAPPENS

The numerous tiny salt crystals transfer most of the force you apply toward the walls of the cardboard cylinder instead of straight down, leaving almost no force being applied against the thin paper. Trusses and beams made for large structures such as bridges and tall buildings use similar designs to spread or change the direction of forces and loads.