

MOVING GLASS SHEET

1. TECHNICAL DESCRIPTION, BACKGROUND

A piece of glass was cut and then tipped over onto a table during the manufacturing process. Once on the table, the glass was moved with the help of suction cups.

2. PHENOMENON

- The glass does not break when it hits the table.
- For a certain period of time, the glass can be moved across the table with a small amount of force. (Ideal Case)

3. FIND THE REASON

- Why does the glass not break?
- Why can the glass be moved across the table with a small amount of force?

4. ENGINEERING CALCULATIONS

A/ Consider the piece of glass and the table as infinitely large surfaces. The problem should also be considered as one-dimensional, with movement only occurring at a constant speed, and only in the x direction (see **Figure 1**), with the pressure gradient in the fluid =0. Calculate the force required to move a $1 \text{ [m}^2\text{]}$ piece of glass.

$$F = ? \text{ [N]}$$

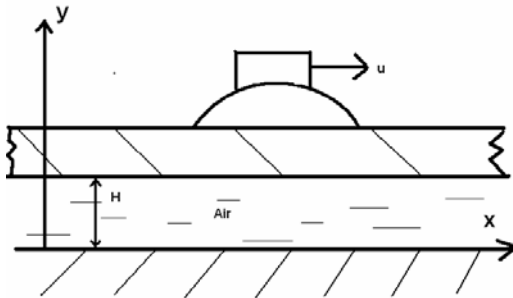


Figure 1.

Data:

Size of glass sheet $A = 1 \text{ [m}^2\text{]}$

Constant speed of movement $u = 2 \text{ [m/s]}$

Mean clearance between the glass and the table $H = 0.5 \text{ [mm]}$

Properties of air: $M = 29 \text{ [kg/mol]}$, $T = 293.15 \text{ [K]}$, $p = 1 \text{ [bar]} = 10^5 \text{ [pa]}$, $\nu = 1.51 \text{E-}5 \text{ [m}^2\text{/s]}$