JETS Challenge 105
The Hershey's Kiss Takes Flight!

July 1, 2007 was the 100th anniversary of the first Hershey's Kiss! Today, the company makes 80 million of these tasty treats each DAY! Each Kiss is wrapped in 6.35 cm^2 of aluminum foil that is 0.00153cm thick. The density (mass per cubic meter) of aluminum is 2700 kg/m^2 .

A Boeing 777 is one of the most efficient passenger aircraft ever built. The maximum gross takeoff weight is 299, 3700 kg, which includes 171,170 liters of jet fuel at 0.762 kg/liter. About 70% of its remaining mass is made of aluminum.

The Challenge: How many days of production of Hersey Kiss wrappers are required to equal the mass of the aluminum needed to make a Boeing 777?

SOLUTION:

KISSES
80 million per day
6.35 cm^2 foil
0.00153 cm thick
Density = 2700 kg/m^3

Volume
V= $(0.0635m^2)(0.0000153m)$
= 6.17×10^{-8} m^3

Mass
M = 2700 kg/m^3 $(6.17 \times 10^{-8}$ $m^3)$ =
= 1.67×10^{-4}kg

Daily Production
(80 million/day)$(1.67 \times 10^{-4}$kg)
= 13,327.2 kg/day

BOEING
299,370 kg
171,170 liters fuel

Mass Fuel
(171,170 *l*)(0.762 kg/*l*)
= 130,430 kg

Remaining Mass
299,370 – 130,430
= 168,940 kg

70% Aluminum
0.70(168,940 kg)
= 118,258 kg

$$\frac{118,258 \text{ kg}}{13,327.2 \text{ kg/day}} = 8.9 \text{ days}$$

ANSWER: 8.9 days of production

JETS Challenge problems are generously provided by Dave Meredith, Associate Professor, Penn State University-Fayette