
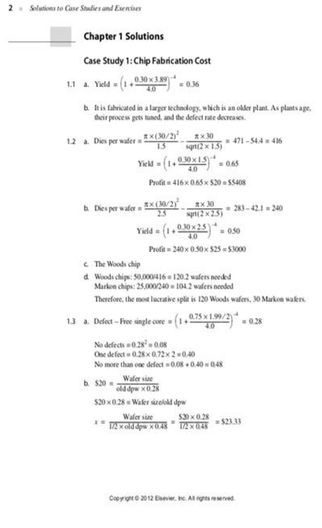

2 ▪ *Solutions to Case Studies and Exercises*

Chapter 1 Solutions

Case Study 1: Chip Fabrication Cost

1.1 a. $\text{Yield} = \left(1 + \frac{0.30 \times 3.89}{4.0}\right)^{-4} = 0.36$

b. It is fabricated in a larger technology, which is an older plant. As plants age, their process gets tuned, and the defect rate decreases.

1.2 a. $\text{Dies per wafer} = \frac{\pi \times (30/2)^2}{1.5} - \frac{\pi \times 30}{\text{sqrt}(2 \times 1.5)} = 471 - 54.4 = 416$

$\text{Yield} = \left(1 + \frac{0.30 \times 1.5}{4.0}\right)^{-4} = 0.65$

$\text{Profit} = 416 \times 0.65 \times \$20 = \$5408$

b. $\text{Dies per wafer} = \frac{\pi \times (30/2)^2}{2.5} - \frac{\pi \times 30}{\text{sqrt}(2 \times 2.5)} = 283 - 42.1 = 240$

$\text{Yield} = \left(1 + \frac{0.30 \times 2.5}{4.0}\right)^{-4} = 0.50$

$\text{Profit} = 240 \times 0.50 \times \$25 = \$3000$

c. The Woods chip

d. Woods chips: 50,000/416 = 120.2 wafers needed
Markon chips: 25,000/240 = 104.2 wafers needed

Therefore, the most lucrative split is 120 Woods wafers, 30 Markon wafers.

1.3 a. $\text{Defect – Free single core} = \left(1 + \frac{0.75 \times 1.99/2}{4.0}\right)^{-4} = 0.28$

$\text{No defects} = 0.28^2 = 0.08$
$\text{One defect} = 0.28 \times 0.72 \times 2 = 0.40$
$\text{No more than one defect} = 0.08 + 0.40 = 0.48$

b. $\$20 = \frac{\text{Wafer size}}{\text{old dpw} \times 0.28}$

$\$20 \times 0.28 = \text{Wafer size/old dpw}$

$x = \frac{\text{Wafer size}}{1/2 \times \text{old dpw} \times 0.48} = \frac{\$20 \times 0.28}{1/2 \times 0.48} = \$23.33$

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