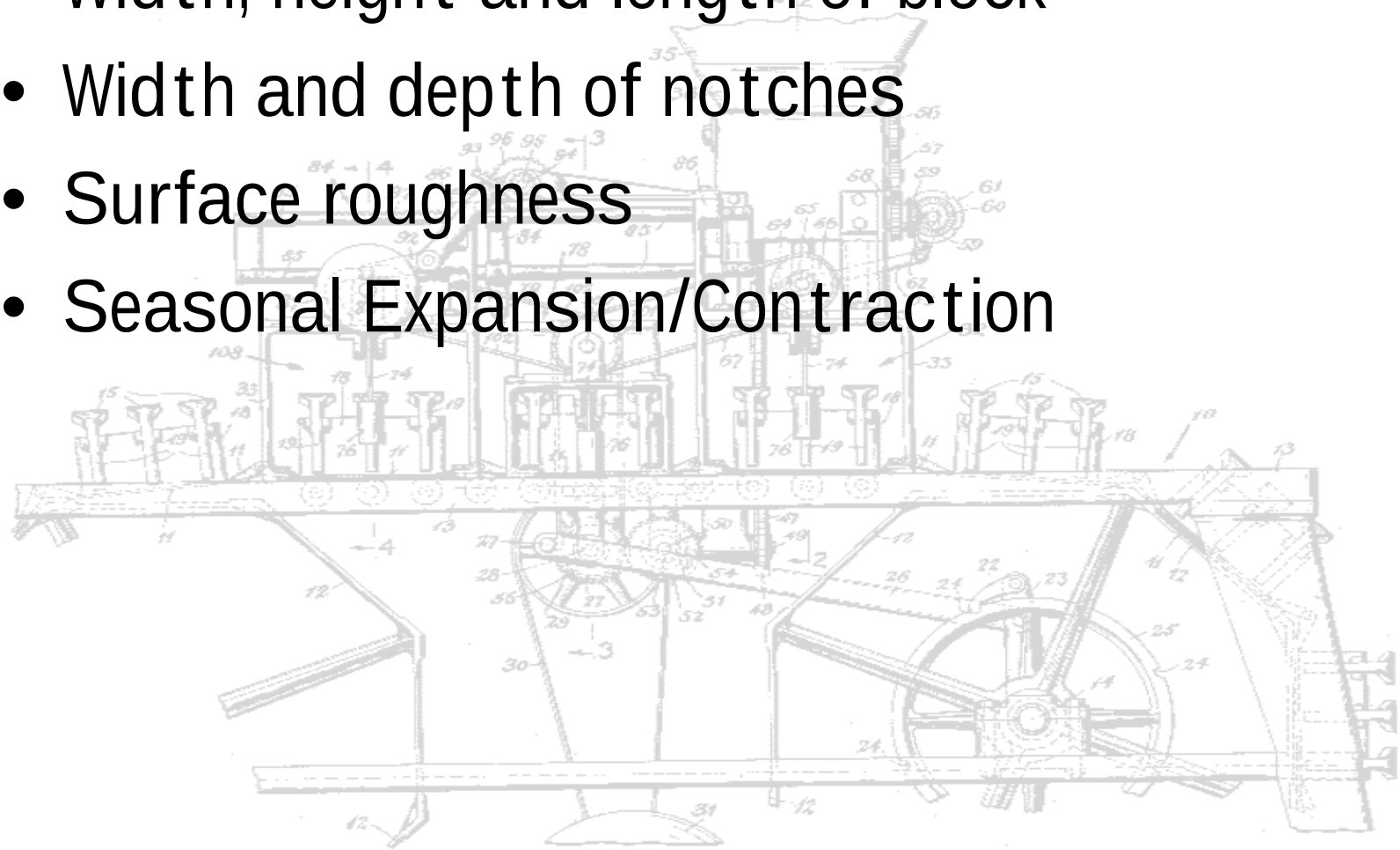
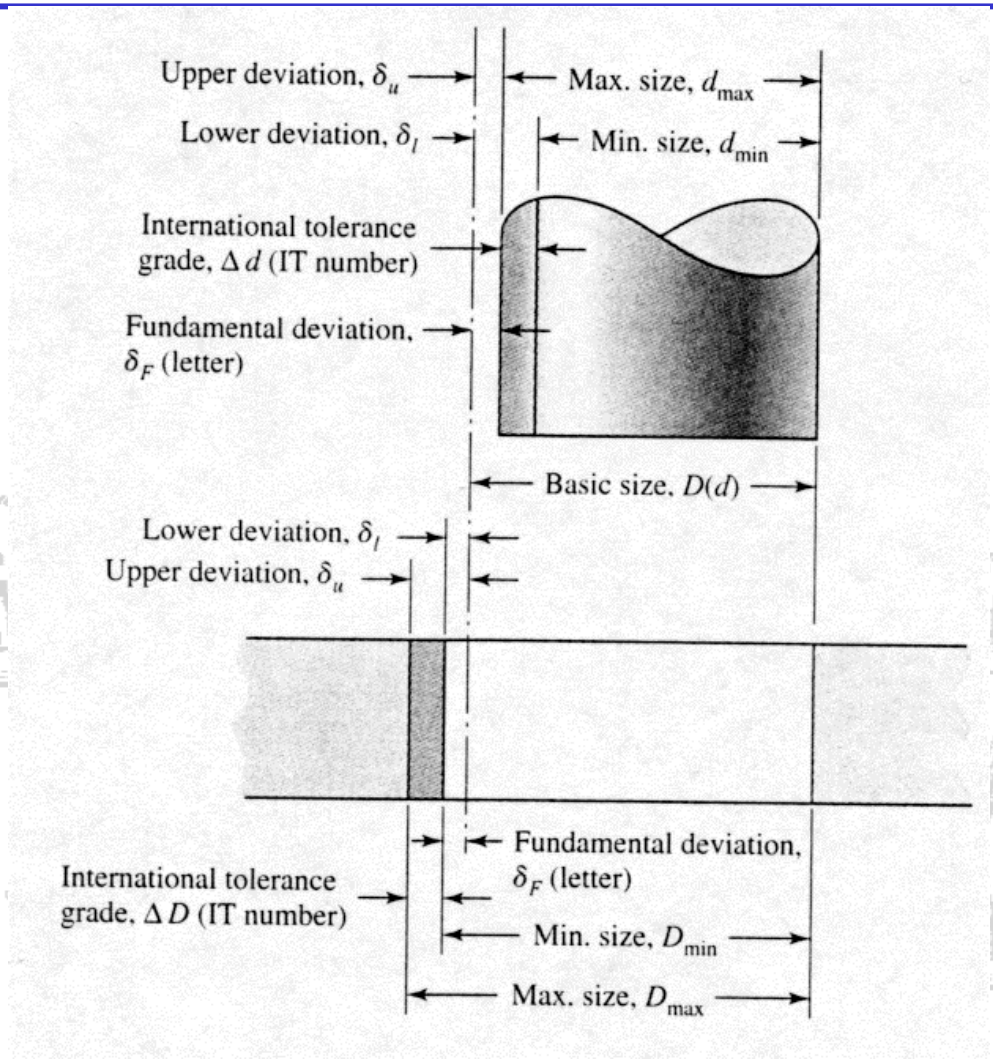
Dimensional Tolerance

- Width, height and length of block
- Width and depth of notches
- Surface roughness
- Seasonal Expansion/Contraction

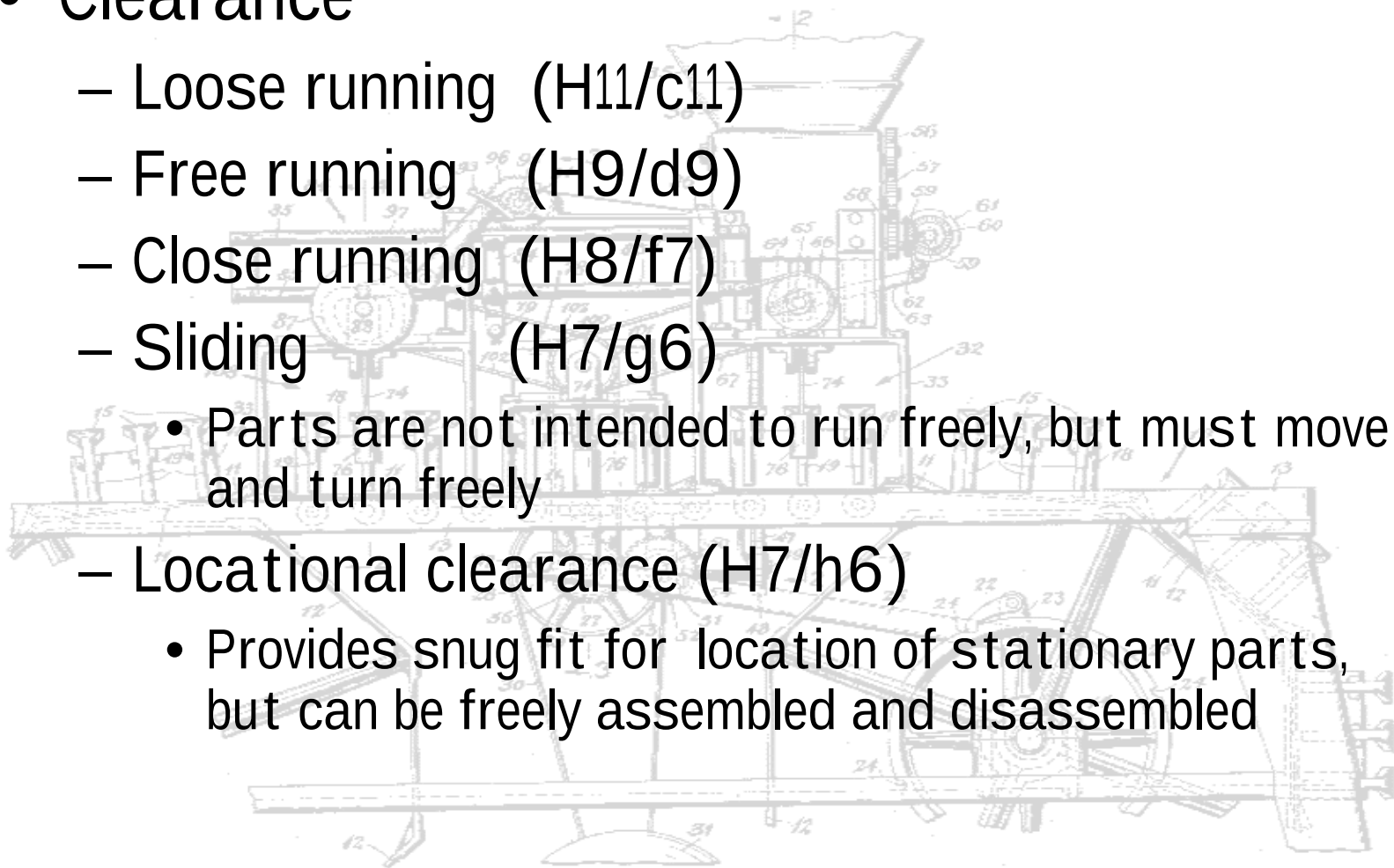


Dimensional Tolerance



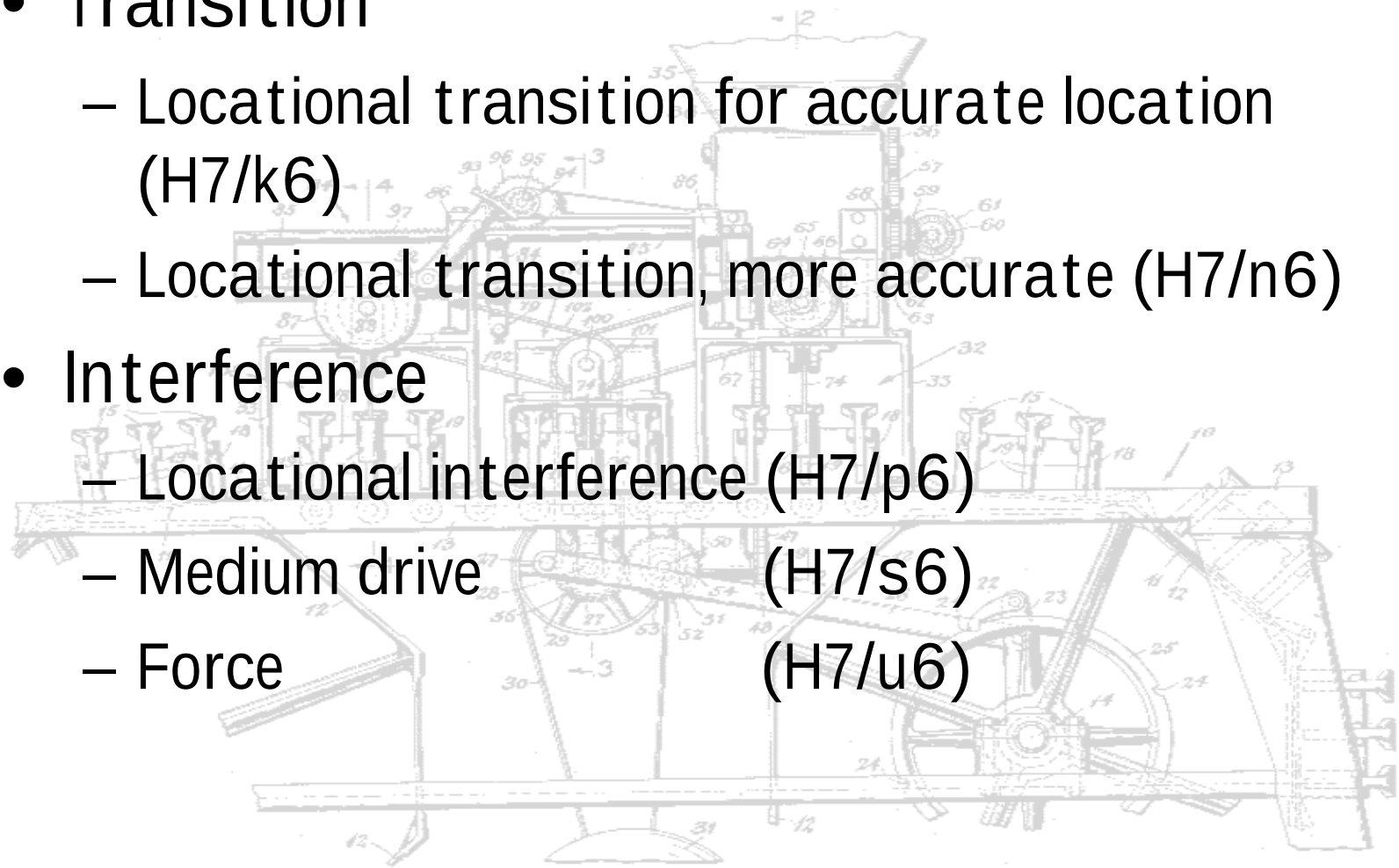
Limits and Fits - Type of Fit

- Clearance
  - Loose running (H11/c11)
  - Free running (H9/d9)
  - Close running (H8/f7)
  - Sliding (H7/g6)
    - Parts are not intended to run freely, but must move and turn freely
  - Locational clearance (H7/h6)
    - Provides snug fit for location of stationary parts, but can be freely assembled and disassembled



Limits and Fits - Type of Fit

- Transition
  - Locational transition for accurate location (H7/k6)
  - Locational transition, more accurate (H7/n6)
- Interference
  - Locational interference (H7/p6)
  - Medium drive (H7/s6)
  - Force (H7/u6)



Limits and Fits - Tolerance Grades

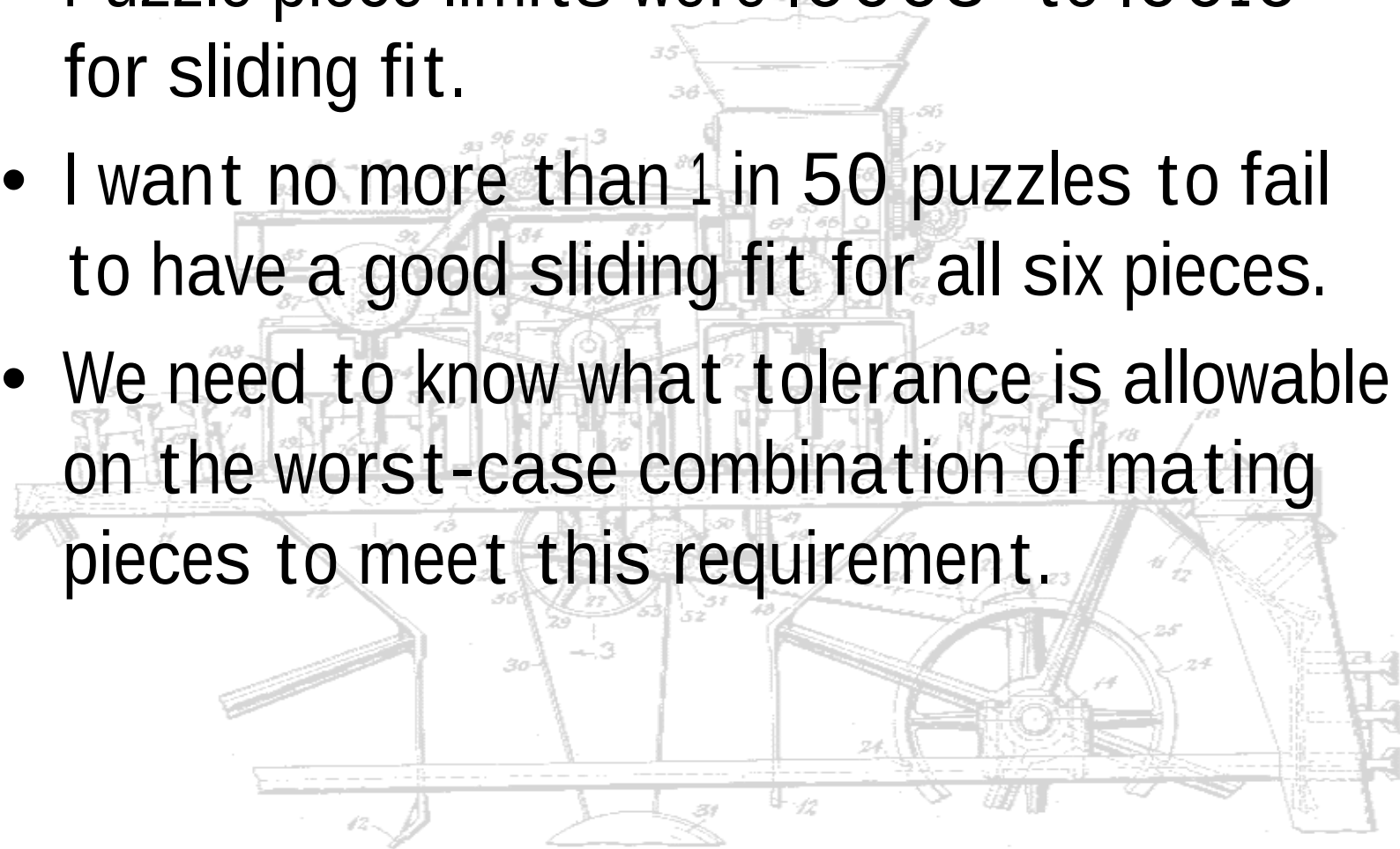
- H7/g6 = Hole with tolerance grade of 7, and shaft of fundamental deviation “g” and tolerance grade 6.
- Hole limits
  - Maximum Material Condition (MMC) = basic size = D
  - Least Material Condition (LMC) = D +) D
  - For grade 7 and D=3/4”,) D=0.0008”, so D=0.7500”, D+) D=0.7508”

Limits and Fits - Tolerance Grades

- Shaft Limits
  - Fundamental deviation class ‘g’, sliding fit, for basic size 3/4” = $*_F$ = -0.0003”
  - Tolerance grade for sliding fit is 6, for basic size 3/4”,) d = 0.0005”
  - MMC = d + $*_F$ = 0.7497”
  - LMC = d + $*_F$ -) d = 0.7492”
- Max clearance = 0.7508-0.7492 = 0.0016”
  Min clearance = 0.7500-0.7497 = 0.0003”

Manufacturing Tolerance

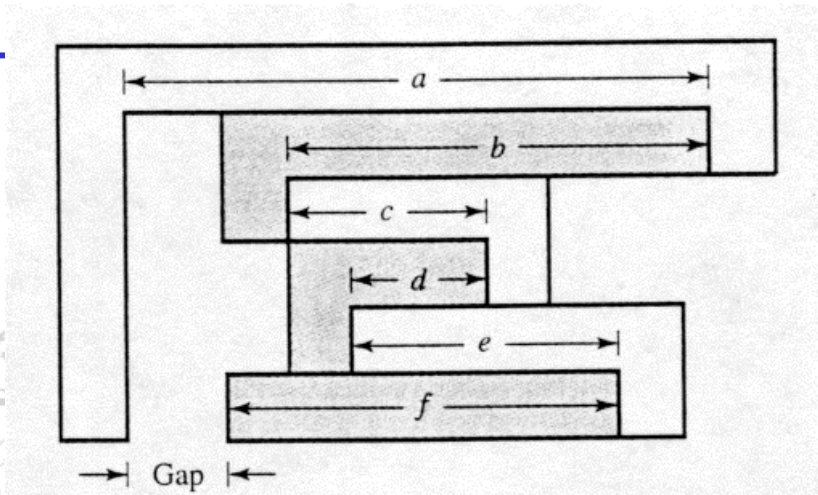
- Puzzle piece limits were .0003” to .0016” for sliding fit.
- I want no more than 1 in 50 puzzles to fail to have a good sliding fit for all six pieces.
- We need to know what tolerance is allowable on the worst-case combination of mating pieces to meet this requirement.



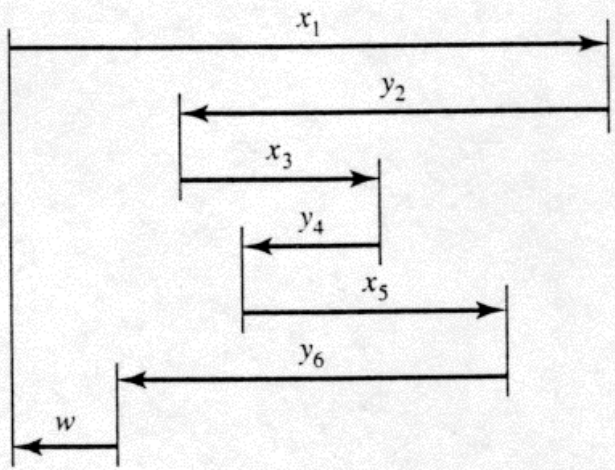
Manufacturing Tolerance

- gap = additive parts - subtractive parts (Eq.2-13, Fig 2-7)
- mean gap = 3 mean of additive widths - 3 mean of subtractive widths
- tolerance = (max gap - min gap) / 2 = 3 individual tolerances
- Find max allowable tolerance on block width/height and notch width/depth for a given pair of gap limits.

Manufacturing Tolerance



(a)



(b)