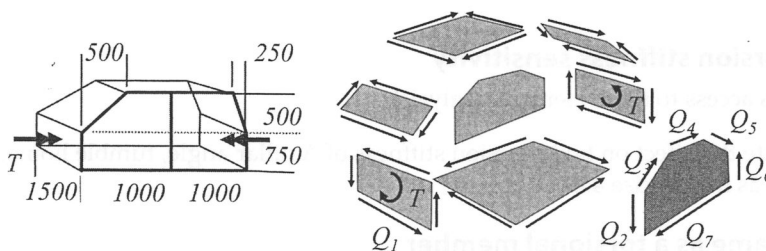


Exercise 5.12

### 5.13 Torsion of sedan

The sedan cab shown is loaded by a torque acting on the dash panel, and a reaction torque acting on the rear panel, as shown. For the dimensions in mm given:

- Use moment equilibrium for each panel to relate unknown edge loads. This set of seven equations can be expressed in matrix form as  $\mathbf{A}\mathbf{Q}=\mathbf{T}$ , where  $\mathbf{A}$  is a square matrix of coefficients,  $\mathbf{Q}$  is a column matrix of the edge loads, and  $\mathbf{T}$  is a column matrix of applied torques.
- For  $T=12.7 \times 10^6 \text{ Nmm}$ , solve the equations from part a for the internal loads,  $Q_i$ ,  $i=1$  to 7.



Exercise 5.13

### 5.14 Flow of torsion strength loads

A structure consists of a central thin-walled backbone beam and shear panels, which can only react loads within their plane. We are interested in the torsion performance of the structure. The car body is supported at the two rear suspension points and loaded with a twist ditch torque applied by a couple ( $Fw$ ) to the front suspension points.

- Solve for the reaction forces,  $F$ , based on applied twist ditch torque.