use paramterization of given surface by

$$x = \cos\theta \quad , y = \sin\theta , \quad z = z$$

$$R(\theta, z) = \cos\theta\, \hat{i} + \sin\theta\, \hat{j} + z\hat{k}$$

$$0 \le \theta \le 2\pi \quad , \quad 0 \le z \le x+2$$

$$R_\theta = -\sin\theta\, \hat{i} + \cos\theta\, \hat{j} \quad , \quad R_z = \hat{k}$$

$$\begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ -\sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{vmatrix}$$

$$\hat{i}(\cos\theta) - \hat{j}(-\sin\theta)$$

$$R_\theta \times R_z = \cos\theta\, \hat{i} + \sin\theta\, \hat{j}$$

$$\boxed{dS = \|R_\theta \times R_z\|\, dz\, d\theta = dz\, d\theta}$$

$$\iint_S x\, dS = \int_{\theta=0}^{2\pi} \int_{z=0}^{x+2} \cos\theta\, dz\, d\theta$$

$$\Rightarrow \int_{\theta=0}^{2\pi} (x+2)\cos\theta\, d\theta = \int_{\theta=0}^{2\pi} (\cos\theta + 2)\cos\theta\, d\theta = \int_{\theta=0}^{2\pi} \cos^2\theta + 2\cos\theta\, d\theta$$

$$\Rightarrow \int_{\theta=0}^{2\pi} \frac{\cos 2\theta + 1}{2} + 2\cos\theta\, d\theta \Rightarrow \left[\frac{\sin 2\theta}{4} + \frac{\theta}{2} + 2\sin\theta\right]_0^{2\pi} \Rightarrow \frac{2\pi}{2} = \boxed{\pi}$$