Geometric interpretation of the identity: $(\vec{\boldsymbol{a}}\cdot\tilde{\boldsymbol{a}})\,\vec{\boldsymbol{x}} = \vec{\boldsymbol{a}}\,(\tilde{\boldsymbol{a}}\cdot\vec{\boldsymbol{x}}) - \tilde{\boldsymbol{a}}\times(\vec{\boldsymbol{a}}\times\vec{\boldsymbol{x}})$
— nonorthogonal projection onto LINE $\oplus$ PLANE (direct sum)

$\vec{\boldsymbol{x}}_1 = \alpha\vec{\boldsymbol{a}}$ where

$$\alpha = \frac{x_1}{a} = \frac{x_\parallel}{a_\parallel} = \frac{\tilde{\boldsymbol{a}}\cdot\vec{\boldsymbol{x}}}{\tilde{\boldsymbol{a}}\cdot\vec{\boldsymbol{a}}}$$

$\vec{\boldsymbol{x}}_2 = -\,\tilde{\boldsymbol{a}}\times\vec{\boldsymbol{d}}$ where

$$d = \frac{x_2}{\tilde{a}} = \frac{x_\perp}{\tilde{a}_\parallel} = \frac{|\vec{\boldsymbol{a}}\times\vec{\boldsymbol{x}}|}{\vec{\boldsymbol{a}}\cdot\tilde{\boldsymbol{a}}}$$