

Ship Impact Assessment

PAFA Consulting Engineers have developed formulae that allow estimates to be rapidly made of the Energy, Force, Penetration and Time relationship for a ship impacting a bridge pier.¹

These formulae are based on the widely referenced Minorsky equation and involves many of the structural mechanisms that occur in a collision, in particular: crushing, bending, scraping, stretching, compression, buckling, folding, and tearing. Strain rate effects were also considered to be sufficiently significant to warrant consideration.

The iterative methodology was originally derived by Paul Frieze to deal with bow damage from impacts with bridge piers on the River Severn and River Thames.

It has subsequently been applied to a risk assessment of the A249 road crossing of The Swale between Kent and the Isle of Sheppey; covering damage to both the bridge piers and deck.

Furthermore, the method has been applied to ship-to-ship collisions with particular emphasis on shuttle tanker bows impacting FPSO sterns for the UK oil and gas industry.

PAFA Consulting Engineers have been involved in the following projects:

- Thames Crossing at Dartford (M25)
- Second Severn Crossing (M4)
- Ting-Kau Bridge, Hong Kong
- Foyle Bridge
- Papendorpse Bridge, Holland
- Swale Crossing (A249)
- Faselane Floating Dock
- Northern Producer
- Shuttle tanker to FPSO collisions

¹ Frieze, P. A and Smedley, P. A. "Ship Bow Damage During Impacts with Ships and Bridge Piers", 2nd International Conference on Collision and Grounding of Ships, ICCGS, Copenhagen, Denmark, 2001.

Summary

- Ship impact methodology
- Iterative calculation
- Rapid and cost effective
- Effect on ship and bridge
- Risk assessment
- Worldwide application
- Applied to ship collisions with bridges, dock gates and FPSO vessels

Clients

- Halcrow Group
- THES
- Carillion / Symonds Group
- Global Maritime
- Health & Safety Executive

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