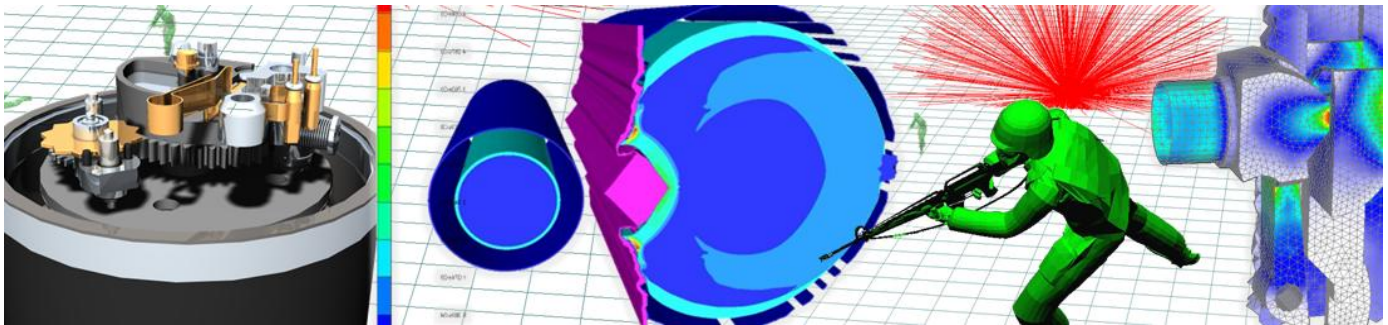


Design, Modelling & Simulation



- Design Services
- Ballistics
- Finite Element Analysis
- Multibody Dynamics Simulation
- System Performance & Effectiveness
- Software Development



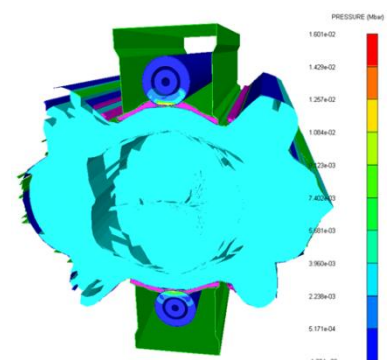
System Design Evaluation offer a comprehensive range of Design, Modelling and Simulation services to assist rapid, cost effective engineering design, validation and problem solving. This core capability is supported by specialist expertise and a cutting edge suite of commercial and bespoke software tools.

SDE has significant experience in the application of Computer Aided Engineering (CAE)

techniques, including Finite Element Analysis (FEA), Ballistic modelling, Multibody Dynamics simulation, Computer Aided Design (CAD) and System Performance & Effectiveness assessment, to support a wide range of engineering design, development and procurement programmes.

These advanced virtual prototyping tools have been used to provide robust evidence and facilitate informed and

auditable decision whilst reducing the requirement for, often costly, time-consuming or impractical, Test and Evaluation activities.



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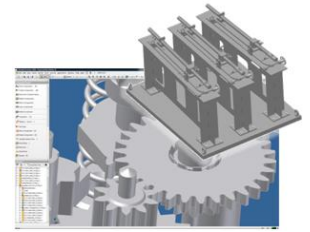
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Design Services

Engineering design services form an integral part of SDE's DM&S capability. Through a combination of skilled CAD draughtsmen and experienced designers, the Company has the ability to fully support the design process from initial conception to final production of full drawings for manufacture.



Ballistics

SDE has a unique range of internal, intermediate and external ballistic analysis tools to enable full simulation of the in-barrel and flight characteristics of both kinetic energy and rocket propelled projectiles. These tools can be used to undertake a wide variety of studies including:



- Aerodynamic performance assessment (inc. mass asymmetric projectiles).
- Firing tables (ground and line of sight) & Weapon zeroing charts.
- Muzzle exit analysis (prediction of initial yaw rates and angles).
- Projectile and barrel design and optimization.
- Radar Data Analysis (met correction of drag coefficient data).

Finite Element Analysis

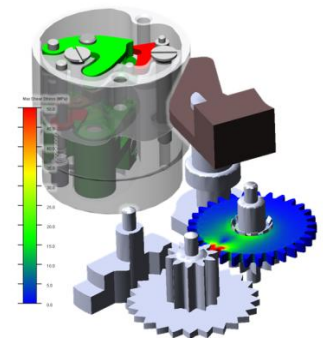
Using industry standard Finite Element codes SDE can undertake a variety of analyses to determine system, sub-system or component response to static or dynamic structural loadings and/or heat flux. SDE also has considerable experience in the use of specialist explicit hydro-code modelling software capable of simulating ultra high-speed events including projectile/fragment impacts and explosive reactions. These FE tools can be applied to a range of engineering analyses including:

- Structural response to static or dynamic loading, heat flux, platform vibration, blast or impact.
- Operational fatigue life prediction.
- Design optimisation such as weight reduction.
- Optimisation of armour, warhead fragmentation patterns and kinetic energy penetrators.
- Sympathetic reaction of explosive materials and optimisation of mitigation structures.

Multibody Dynamics Simulation

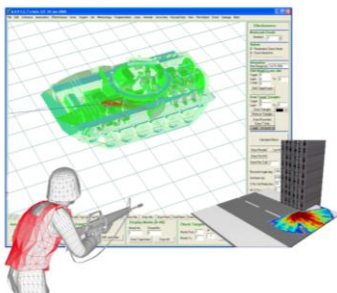
SDE has significant expertise in the field of rigid and flexible multibody dynamics simulation. Through application of a variety of geometrical and load constraints, the kinematics of complex mechanisms can be simulated, allowing rapid validation and optimisation of multiple candidate design solutions. Modelling of critical components as linear elastic flexible bodies also allows assessment of SoD in a fully dynamic environment. This capability has found considerable utility in studies such as:

- Kinematic and SoD design validation of Safe and Arm fuse Units.
- Modelling and verification of weapon feed and ejection system functionality.
- Design optimisation studies of factors such as parametric geometry, spring forces, frictional coefficients, axial and centripetal accelerations.
- Low cost virtual trialling of design iterations.



System Performance & Effectiveness

SDE has developed a proprietary software tool, ASPECT, capable of quantifying the detailed performance of a weapon and overall effectiveness in the context of realistic battlefield scenarios. ASPECT formulates the error budget of the system and predicts the terminal effect on the target in order to build up a full effectiveness simulation. The outputs of simulations can be tailored to specific requirements, typically including probabilities of suppression/incapacitation, time to suppress/incapacitate, and quantity of effective/wasted ammunition. ASPECT has been used to support programmes such as:



- UK Future Integrated Soldier Technology (FIST) programme.
- Norwegian NORMANS programme.
- Australian LAND 125 programme.

Software Development

Software development is a key area within the DM&S capability. SDE's extensive knowledge base has been used to generate bespoke software for a wide range of applications including: CCOM6 for ballistic trajectory modelling of mass asymmetric projectiles; LFIT for control of SDE's unique trials acoustic targetry system; and ASPECT for lethality and effectiveness modelling.