Helicopter operations
OIL & GAS CONSULTANCY SERVICES
As Oil & Gas Exploration and Production activities are located further offshore, it is crucial that helicopters can operate safely during landing and take-off procedures.

Helicopter operations to and from offshore helidecks involve elevated risks compared to operating over land because of the increased distances between landing sites and the potential for adverse weather conditions offshore. So when landing offshore, it is important that the environmental conditions at the helideck are not made worse by poor helideck design.

Two of the biggest impacts to helideck environmental conditions are turbulence and hot turbine exhaust. Wind turbulence generated from airflow over obstructions such as the superstructure, drilling derricks, and exhaust stacks can significantly increase the pilot workload on approach and landing. If too severe, the pilot may lose control of the aircraft.

Additionally, small increases in air temperature in the approach path and over the helideck from the platform hot exhaust gases can result in a dramatic loss of rotor lift. Exhaust gases ingested into the helicopter engine can also cause flameout and catastrophic loss of power.

BMT are recognised authorities on offshore helideck aerodynamics and flight safety. We use our world-class wind tunnel facilities and state-of-the-art computational modeling resources to provide designers and operators clear and insightful assessments of proposed helideck designs.

KEY SERVICES
- Desktop reviews of platform/vessel design in concept stage
- Detailed assessments of helideck turbulence, downdraft, hot gases and hydrocarbon gas releases
- Helideck/superstructure design advice
- Assessment of design modifications
- Pilot workload assessment
- Passenger and crew wind comfort
- Wind Tunnel assessment and Computational Fluid Dynamics

KEY BENEFITS
- Early indication of potential helideck operability problems
- Depth of experience providing recommendations for design changes to minimise operational limitations
- Compliance with regulatory and operation requirements (e.g. CAP 437 & NORSOK C-004)
- Compliance with Health and Safety Limits for exposure to hazardous gases
- Clear and insightful reports that provide valuable information for operators and helicopter pilots

UNRIVALLED EXPERIENCE
BMT Fluid Mechanics have carried out several important helicopter operations research projects for regulatory bodies such as the UK Civil Aviation Authority (CAA) and Health and Safety Executive (HSE). Lessons learnt from these research projects were used to compile key industry regulatory documents such as the CAA Helideck Design Considerations – Environmental Effects and CAP 437.

Our involvement in these projects and the completion of more than 100 offshore helideck assessments gives us unrivalled experience and capability in the assessment of offshore helidecks for operability.

BMT benefit from having both state-of-the-art wind tunnel and Computational Fluid Dynamics computer modeling facilities to provide the most accurate quantitative assessments of helideck environments. We have been using both tools for many years and know when to apply each to ensure compliance with regulatory criteria and maximize operability.

RISK SOURCES
It is inevitable that helidecks installed on the cramped decks of offshore structures will suffer to some degree from their proximity to tall and bulky structures. The environmental effects produced will often result in restrictions to helicopter operations, either in terms of payload, or perhaps completely prohibiting operations under certain meteorological conditions.

Pilots undertaking critical landing and take-off manoeuvres on these helidecks are faced with the potential of highly disturbed airflow which can include severe wind-shear, downdraughts and high levels of turbulence.
**WIND TURBULENCE**

Wind turbulence presents one of the highest safety risks to offshore flight operations. Due to its potential to cause major accidents, regulatory agencies in different parts of the world have issued design guidelines to minimize the risk associated with wind turbulence and ensure safe helicopter operations.

Computational Fluid Dynamics (CFD) and wind tunnel testing are the only tools available to predict the turbulence field around a helideck. Both CAP 437 and NORSOK C-004 regulations recommend the use of CFD or wind tunnel testing to assess the turbulence levels and compliance requirements. BMT Fluid Mechanics has extensive expertise using both tools that we own and run ourselves.

**EXHAUST GASES**

Sources of hot gases are frequently found on offshore facilities where exhaust temperatures can be several hundred degrees above ambient. Examples include flares, turbines and other power generation and cooling equipment. When these gases disperse into the helicopter approach, departure and landing paths they potentially create a severe operational risk because any rise in ambient temperature along the flight path will result in a loss of both engine and rotor performance.

It is therefore essential that the exhaust plume is kept well clear of the helicopter operations area. The risk is highlighted particularly by the fact that a temperature rise of only 2°C is sufficient to affect helicopter performance and handling.

BMT use CFD and wind tunnel testing to predict the effects of hot gases on helicopter performance.

Many combinations of release and wind conditions can be tested and design modifications or operating restrictions can be established. Both CAP 437 and NORSOK C-004 regulations recommend the use of CFD or wind tunnel testing to assess temperature and density changes.

**HYDROCARBON GAS EMISSIONS**

Unburnt hydrocarbon gas emissions from cold flaring or emergency blowdown systems pose significant risks to helicopter operations on Oil & Gas installations. Concentrations above 10% Lower Flammable Limit (LFL) can cause helicopter engines to surge and flame out leading to severe accidents. Similarly, a flammable gas cloud in contact with a potential source of ignition like a helicopter, can pose a risk to the facility itself.

CFD is the primary tool used to predict hydrocarbon gases dispersion. BMT Fluid Mechanics has in depth experience in using CFD for gas dispersion processes on offshore facilities.