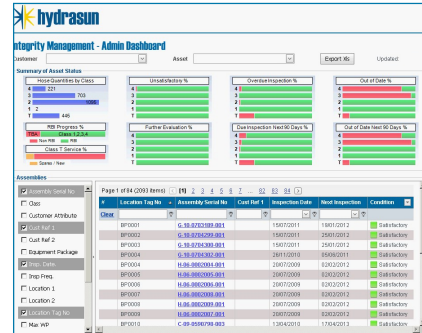


# CASE STUDY

## Risk-Based Integrity Management and Maintenance Programme for Flexible Hose Assemblies across UK Navy Fleet



### Background

Until 2007 the maintenance strategy of the UK Navy for Flexible Hose Assemblies (FHAs) was to remove and replace all FHAs every 4 years or 8 years dependant upon their deployment in either a harsh or non-harsh environment, irrespective of the condition of the FHA or the criticality of it to platform operations, personnel safety or the environment. There was also no inspection regime in place for the FHAs between these planned replacement cycles to assure their technical integrity.

This maintenance strategy was both expensive to the UK Ministry of Defence (MOD), because FHAs were being replaced before the end of their operational life, and ineffective in preventing loss of containment as a result of the lack of any inspection regime being in place to monitor the condition of the FHAs between replacement intervals.

### MOD Issue

The MOD was under pressure from the UK Government to reduce maintenance costs and improve fleet uptime from what was a diminishing number of platforms available to deploy into theatre. It was clear that the current maintenance strategy was not fit-for-purpose and that a new approach was required.

From analysis of available data it was also clear that although the root causes for loss of containment were varied they could generally be grouped into causes associated with external damage to the FHA from operational factors or poor installation and routing of the FHA. Any changes to the material specification of the FHAs were therefore unlikely to have any meaningful impact on performance.

Unplanned maintenance costs were significant both in terms of the procurement of replacement FHAs, yard time for completing the assembly and installation work and the retention of high levels of spares.

### At a glance...

#### Customer

UK Ministry of Defence

#### Location

UK and overseas

#### Customer Issue

High maintenance expenditure as result of unplanned and unnecessary remedial work associated with FHAs

#### Hydrasun Solution

Develop and implement risk-based FHA inspection and maintenance programme across the fleet

#### Benefits

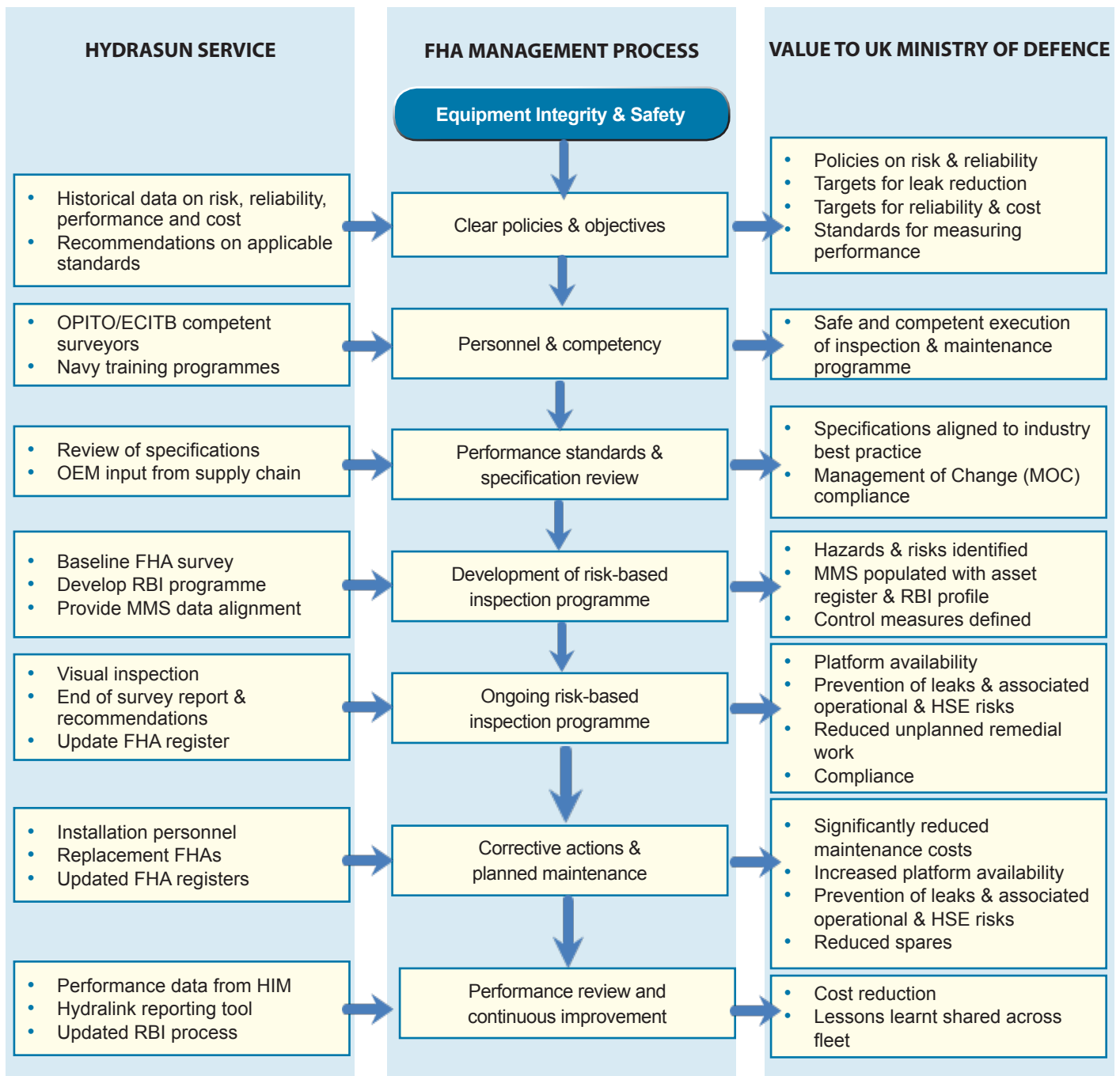
- FHA maintenance expenditure reduced by more than 30% across the fleet
- Improved fleet uptime through reduced unplanned remedial work and more effective planned maintenance
- Technical integrity of FHAs assured through risk-based inspection programme
- Reduced operational, safety and environmental risks from FHA leaks
- Reduced cost of purchased spares and spares management costs through improved inventory management system
- Safe and competent execution of FHA integrity management programme

# CASE STUDY

## Risk-Based Integrity Management and Maintenance Programme for Flexible Hose Assemblies across UK Navy Fleet

### Hydrasun Solution

Hydrasun has been providing a risk-based integrity management and maintenance service for flexible hoses to the international oil and gas industry since 1992. Through combining this knowledge with the experience of former UK Navy staff now employed by Hydrasun, we were able to develop a risk-based integrity management and maintenance strategy for the UK Navy as outlined below: -



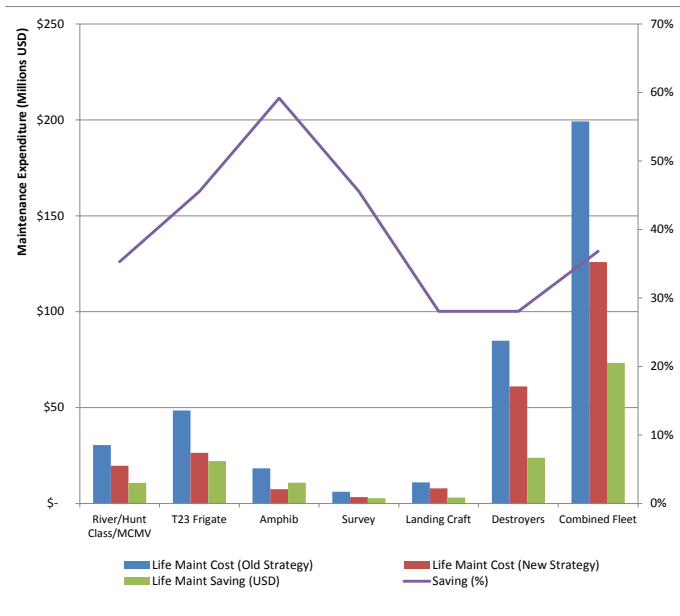
## Risk-Based Inspection Programme

Hydrasun hose surveyors completed a thorough external visual examination of all FHAs on each platform to determine their current condition, specification and parent equipment package details to produce a detailed FHA register for the platform. This data was reviewed by Hydrasun and MOD engineers to risk assess each FHA, based upon a qualitative assessment of the consequences and probability of failure of the FHA on platform operations, safety and the environment. The risk classification was then used to determine suitable inspection and replacement frequencies for the FHAs.

Through implementing the ongoing risk-based inspection (RBI) programme, with competent marine experienced Hydrasun hose surveyors, the UK MOD was able to deliver improved platform availability and significantly reduce the number of loss of containment incidents and costly unplanned maintenance.

## Planned Maintenance

Through the risk assessment process replacement frequencies for FHAs were extended from a standard 4 or 8 years to 5, 10 or 15 years, dependant upon the risk classification of the FHA. During the last 9 years of the contract Hydrasun has delivered \$18M in savings to the MOD across the UK Navy fleet. The graph below demonstrates the realised savings of this strategy to the UK Navy over a 30-year operational life for the current UK Navy surface platforms in operation.



The Hydrasun project management team work with the MOD to ensure the efficient planned execution of this maintenance work to minimise any impact on platform uptime. Through ensuring on-time delivery of replacement FHAs for planned maintenance change-outs the UK Navy is able to rationalise the level of spares being retained. This significantly reduces wastage of spares being scrapped as a result of exceeding their specified shelf life.

## Competent Personnel

All Hydrasun hose surveyors complete an externally accredited training and competency programme for hose inspection over an 18-month period. All personnel supporting the MOD contract are former UK forces personnel and therefore combine trade competency, platform familiarity and security clearance. This ensures inspection programmes are completed efficiently and effectively on each platform.

## Data Management

All inspection data is gathered into the Hydrasun Integrity Management System (HIMS) database by the hose surveyor using an intrinsically safe mobile device. A secure web-based reporting tool, Hydralink, is used to provide key FHA performance data to onshore MOD and offshore fleet personnel which enables:

- Efficient forward planning (to assist with the implementation of scheduled inspection/change-out programmes)
- Control and management of survey data
- Managing integrity assurance of FHAs via a compliance dashboard
- Analysis of failure trends, identifying corrective actions and potential training requirements
- Review of unsatisfactory FHAs, including photographic evidence of faults identified
- Easy access to specification details for each FHA

## The Result

Through developing and implementing the risk-based integrity management and maintenance programme for FHAs across the UK Navy fleet, the MOD is realising a **combined saving in excess of 30%** in maintenance costs. The risk-based inspection programme greatly reduces the potential for loss of containment and associated risk to platform operations, personnel and the environment. Availability of the platforms has been improved through reduced downtime caused by unplanned remedial work and through more effective planned maintenance.



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