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### **Laser re-melting of HVOF thermal sprayed WC-12Co mixed with Inconel-625 coatings for erosion/corrosion applications**

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One of the obstacles of the spray coating process is the porosity of the coated layer, which can majorly affect its performance especially in erosion/corrosion preventative applications. In this research, three coating materials have been prepared, Tungsten carbide cobalt (WC-12Co) of both conventional micro sized Diamalloy 2004 and superfine nanostructured Infralloy™ S7412, mixed with Inconel 625 (Ni-Cr alloy) Diamalloy 1005 to produce very hard coatings applied by HVOF thermally sprayed process onto carbon steel 4041 substrates. The present study will look at investigating the effect of laser post heat treatment of these coatings, to identify if this technique would increase the wear/corrosion protective properties of the coating composite. The substrates were laser treated by varying laser power and scanning speed to five levels each. Using sophisticated techniques such as SEM, EDS and XRD the microstructure, microhardness and the porosity before and after the laser treatment were observed. It was found that the porosity of the coated layer had significantly reduced after the laser treatment. It was noticed that the hardness was strongly related to the amount of the nano particles of WC-12Co as well as the laser parameters.

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### **Application of Industrial Engineering in designing floating production topside facilities**

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As search for offshore oil & gas resources is advancing in deep waters, conventional fixed jacket platforms are being replaced by floating production systems such as FPSO and FLNG. These floaters have to carry out multiple functions like drilling, completion, production, on board processing, carry out enhanced recovery operations, store the processed oil, treat the produced water before safe disposal and offload the stored oil in shuttle tankers. Thus the topsides have to be equipped with large number of handling equipment and process plants, accommodation modules, various SHEQ systems to comply with strict regulations by various regulators and test agencies. The space available on vessel topside deck is limited to limit the size of the vessels thus requiring optimization of the topside facilities to efficiently handle and process the production and satisfy the onshore midstream production plants and mandatory regulations. Another critical factor that influences design of the topsides is that these are on floating vessel which is highly unstable in high seas due to the action of strong wind and sea waves. This is in contrast to onshore installations which are on solid ground and foundations. The interconnection of the plants on floaters needs to be strong and at the same time flexible enough to withstand various vessels motions and mutual displacements of the skids on which the plants are installed. These factors will be discussed in detail to show how Industrial Engineering principles are effectively applied in design and construction.

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