



## Evolution of an industry

# High-tech repair options for ship repairs

By Dale Finnerty  
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While thermal coating has been a common remedy for many years for repairs of heavy equipment in industries such as mining, logging and construction, one local B.C. company has brought the technology to the marine industry and is catching the attention of those ship owners looking to extend the life of repairs on tail shafts, liners, housings, drive components and many other metal alloy components in their vessels.

### What is thermal coating?

Thermal coating is a process in which metallic and non-metallic materials are deposited in a molten or semi-molten form on a prepared component surface to optimize its characteristics and to protect against wear, corrosion and to restore or enhance a worn or damaged surface to its original state.

Thermal spray coatings have been around for a very long time. The first systems developed were referred to as Flame Spray, generally using coal gas, hydrogen or acetylene with oxygen. Spray guns were designed to melt powder alloys and propel them to the surface of the component being repaired.

It wasn't long before development of the Arc Spray process took over as the best means of delivering the coating alloy. A big advantage of the Arc Spray system is the very low heat application of about 65°C. The system uses alloy wire which, at the point of contact in the gun, becomes molten and is then propelled at high pressure onto the surface of the component. These early spray coating repair processes were developed in Germany and then in America. Development had started as early as 1900 but wasn't until about the late 1920s and early 1930s that the technology advanced quickly.

One of the first widespread and extensive uses of thermal coating was during the Second World War when it was realized that worn parts could be restored quickly and at a fraction of the cost of manufacturing a new part. Worn parts could also be restored to their original state much faster than the manufacturing process.

### New technologies eliminate old problems

Many industries soon embraced this new technology, and while the concept and basic design of thermal coating systems started back in the 1920s, today's systems and technological advances are now used throughout the world in dozens of industries — aerospace, power generation, marine, medical implants, oil & gas, heavy equipment repair, mining, pulp & paper mills just to name a few.

While the old technology of thermal coating was once plagued by problems, new advances and continual improvements in equipment, product quality, and training have completely revamped the process. There were many factors that caused

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problems in applying coatings in earlier days — temperatures, alloy quality and bonding ability to name a few. Consequently there were failures and bad experiences that gave the industry a bad rap. Today, the equipment and application methods are quite amazing when done properly. In fact, 40 per cent of the global thermal spray market is based on the aerospace (turbine) market, where the consequences of reliability is measured in human life. They would not be using thermal spray coatings if there was any risk of failure.

Industrial Surface Technologies Inc. uses three types of thermal coating systems: H.V.O.F (High Velocity Oxygen Fuel), Twin Wire Arc Spray and Flame Spray. The first two systems make up the majority of IST's coating business while the Flame Spray is a specialized application geared more toward producing extremely hard-wear surfaces on manufactured products such as liners and sleeves.

HVOF is a system that provides high-density, extremely wear-resistant coatings. This system is more versatile for metallic and carbide coatings and provides extreme resistance to wear parameters like erosion, corrosion, abrasion, sliding, fretting, heat and thermal resistance.



*The old days — problems with temperatures, alloy quality and bonding made early thermal coatings an unattractive solution to most repairs.*

The Twin Wire Arc Spray system at IST has been the work horse for the restoration of worn and damaged components. The system uses wire alloys fed through a gun which electrically melts the alloys at contact and then, by high air pressure, blasts these molten particles at a prepared surface. IST has achieved coating bond strengths exceeding 10,000 PSI. This guards against problems of debonding that the old technologies experienced in earlier systems.

Some advantages of the Arc Spray system is its low temperature during application. Application temperatures are kept below 65°C. This ensures there are no issues of distorting or metallurgical changes to the substrate. Another advantage is the ability to produce large build ups when required on components that are severely damaged. IST has achieved build ups on tail shaft liners, etc. of more than .250/ side or half-inch total on the shaft diameter. Repairs can be achieved from small armatures shafts of only three-quarter-inch diameter up to large tail shafts 18 or more inches in diameter. There are over 120 alloys available to IST that can match most any type of component alloy. Repairs can be done on any ferrous and non-ferrous metal including ductile/cast iron and in addition, internal repairs on housings to restore bearing fits are common.

### Lower Mainland location

These are exciting times for IST. While its Campbell River operation continues to attract new clients and projects, IST



*Advances in thermal coating processes means repairs to components like tail shafts can be done quicker than re-manufacturing and will extend the life of the repair.*

has branched out to be able to offer thermal coating repair services to the Lower Mainland's marine shipyard repair industry. Working in conjunction with Seaspan, IST's thermal coating systems have been set up at the North Vancouver drydock's machine shop. Between IST's services and Seaspan's machining capabilities, the marine industry in the Pacific Coastal region now has access to thermal coating technologies. Already, work has been done on a number of tail shaft repairs, including one for a private, 439-foot yacht (the *MY Serene*), and most recently, for BC Ferries' *Queen of Oak Bay* and the yacht *St. Eval*. Thermal coating repairs can be done for components of all sizes on vessels of all types, from small

boom boats to ferries and cruise ships to ocean-going commercial vessels.

Another important aspect of IST's growth in the shipyard industry has been its efforts to obtain certification from Lloyd's Register Canada (Lloyd's of London), giving customers confidence in their ability to provide quality-assured thermal coating repairs.

For more information about IST's thermal coating process, visit [www.istech.ca](http://www.istech.ca).

*Dale Finnerty has been with IST for over 25 years as a sales consultant. He also manages the sales promotion and marketing and has been actively promoting the Thermal Coating service to the shipyard industry in B.C. with Owner/President Ken Bueckert. Contact can be made at [sales@istech.ca](mailto:sales@istech.ca)*



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