

Eliminate Your Corrosion and Wear Problems... The AEGIS Way



AEGIS brings technical and business goals together in power plant operations; solving the advanced materials, and corrosion, erosion and wear (CEW) challenges that are impacting your site's ability to operate reliably and efficiently.

Our technical staff has over 150 years of experience in material science, advanced materials, and plant operations on hundreds of plants operating globally. The knowledge we hold in this field is second to none, and our interest is to use that knowledge to meet your operating challenges. The process of delivering high value solutions to industry is a root cause/failure analysis process we call; **Operational Forensics**.



Operational Forensics is the first part of a four step process that incorporates the best practices of multiple disciplines to arrive at the **Right Solution** for you.



We have no product list to try to squeeze your problem into for a "fix", at AEGIS we evaluate all of the available technologies to provide the **Right Solution**.

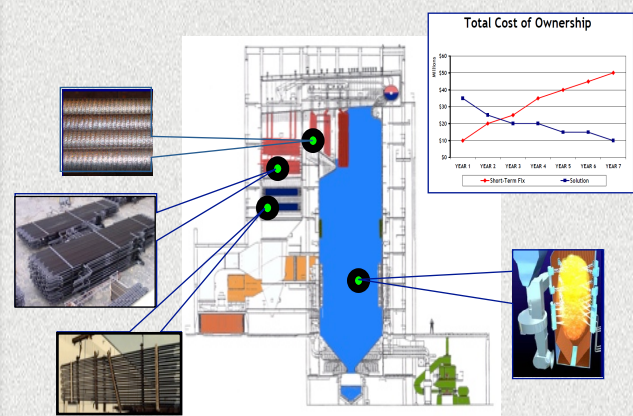


Our Staff Scientists have experience in dealing with virtually every type of material failure, advanced materials challenges, and corrosion, erosion or wear problem that has been seen in a power plant including:

- ◆ Coal Ash Corrosion
- ◆ Stress Corrosion
- ◆ Reducing Environment
- ◆ Fly Ash Erosion
- ◆ Burner Tip Wear
- ◆ Thermal Fatigue
- ◆ Pulverizers
- ◆ Circumferential Cracking
- ◆ Sulfidation / Oxidation
- ◆ Soot Blower Erosion
- ◆ Ash Slurry Erosion
- ◆ ST/LT Overheating
- ◆ Cyclic Fatigue
- ◆ Coal Piping

The Right Solution...

...Delivers Value



AEGIS not only solves your problems, we can deliver the complete solution to your plant. Our capabilities include:

- ◆ **Technical Services**
 - ◆ Full Service Met Lab
- ◆ **Engineering**
 - ◆ Pressure Part Design / Redesign
- ◆ **Manufacturing**
 - ◆ Pressure Parts / BOP
- ◆ **Materials**
 - ◆ Analysis / Specification
- ◆ **Research and Development**
 - ◆ Next Gen Technologies and Materials



AEGIS Prime Solutions

Science Creating Value for Industry

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AEGIS Tungsten



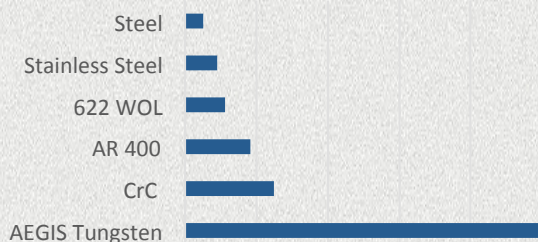
AEGIS Tungsten Provides Exceptional Wear Protection For Extreme Production Requirements

Throughout your plant, you have equipment that is wearing. A single failure can mean unplanned down time, and have a big impact on production, downtime, and ultimately, revenues.

Where other wear products have failed; AEGIS Tungsten can succeed in providing exceptional wear life, and mitigate the risk of a forced outage.

For extreme wear challenges, AEGIS combines a high concentration of wear resistant tungsten carbide with a metallurgical bond, to provide wear protection that far exceeds conventional coating processes.

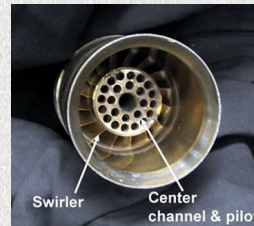
Relative Life of Common Materials
In wear applications



Tungsten performs exceptionally well in abrasive wear and high temperature erosion conditions; extending the useful

life of components by as much as 20 times (or more) that of unprotected parts.

AEGIS Tungsten not only provides superior wear resistance, but it has excellent corrosion resistance as well.



Formulations are customized based on performance requirements; toughness, hardness, wear or corrosion resistance. Tungsten can be provided for:

- ♦ Pump Casing
- ♦ Pump Impellers
- ♦ Coal Splitters
- ♦ Coal Piping
- ♦ Coal Crushers
- ♦ Riffle Plates
- ♦ Pulverizers
- ♦ De-Barking Tools
- ♦ Radial Bearings
- ♦ Burner Nozzles
- ♦ Burner Coal Swirlers
- ♦ Burner Tubes
- ♦ Screw Conveyors
- ♦ Boiler Tube U-Bends
- ♦ Soot Blower Erosion
- ♦ Slurry Pumps
- ♦ Plow Blades
- ♦ Sleeves & Journals

Call us to discuss your challenge or send your inquiry to info@aegisprime.com. When you need a CEW solution, think AEGIS.



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Case Study Example:

Case Study: Secondary Superheater Tube Wastage

Challenge:

A Utility power plant was experiencing on-going wastage of the leading edge superheater tubes in a 400 MW boiler. The plant had requested replacement tubes with a weld overlay coating over the length of the 22' long tube.

AEGIS Approach: (AEGIS Determined Cause - *Sootblower Erosion*)

After gaining additional background information from the Customer, AEGIS responded with two recommendations. The first, meeting the Customer RFQ bid criteria. The second, recommending a targeted surface treatment; using a superior technology and a more suitable lower cost material.

Results:

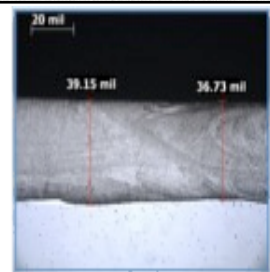
AEGIS' direct RFQ response was competitive with the lowest bids received. AEGIS Alternate recommendation ("highest value solution"), was more than 50% lower in price than all other competitive responses. The laser cladding of a more appropriate material provides the utility with key advantages: longer life, less fouling, better heat transfer and lower O&M costs.

Plant Background Information

1. No.Units: 2
2. Boiler Design: Single furnace, Tangentially fired, Controlled Circulation Radiant Reheat
3. Boiler OEM: C-E
4. Operation Details: Tilting burners with 1005 °F outlet SH/RH Temp.
5. Design Fuel: Lignite with 0.62% Sulfur, 8.0% ash
6. Tubing: 2-1/2" OD x 0.360"mwt, SA-213 T22



Laser Cladding - Tube Interface



Laser Cladding - Uniform thickness:
Easier to clean, better heat transfer



Customer requested configuration:
22' loose tube with weld overlay



AEGIS recommendation:
22' loose tube with three 3' targeted
sections of laser clad using higher
hardness material



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