



# DDG RAST Deckplate Relief



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## Background

Thermal Spray Non-skid (TSN):

- Aluminum based spray
- Protection from rust
- Replacing paint for corrosion and wear resistance
- Corrosion prevention is a CNO Foundry, Fleet, Fight Priority

DDG RAST system:

- Recovery Assist, Secure and Traverse system
- Allows helicopters safe landings.
- Cart and cable system that runs under the flight deck.



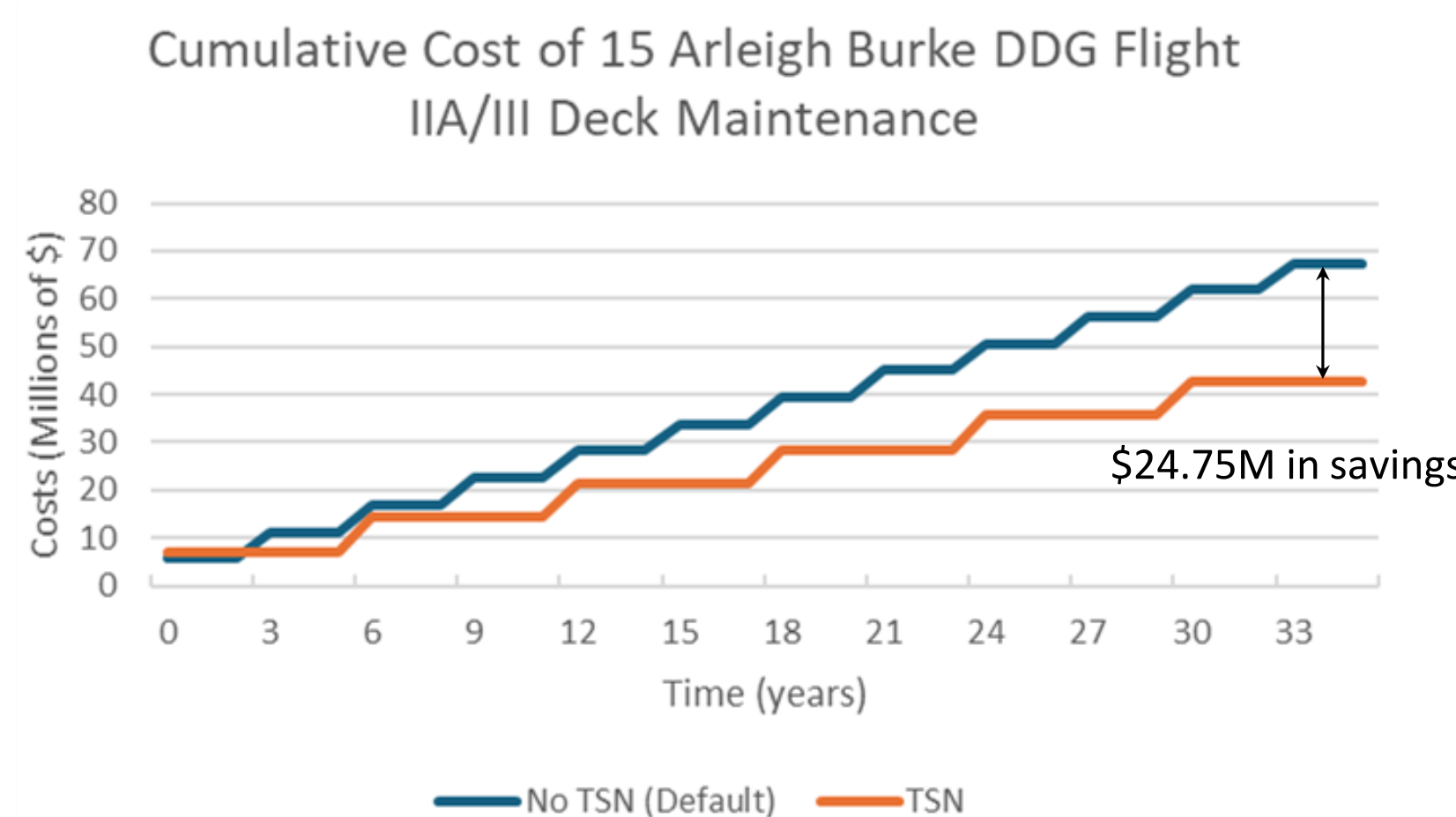
## The Issue

The RAST tracks deflect when TSN is applied due to a difference in the coefficient of thermal expansion. Need to stiffen plates to avoid delaminate when bolted to the deck.

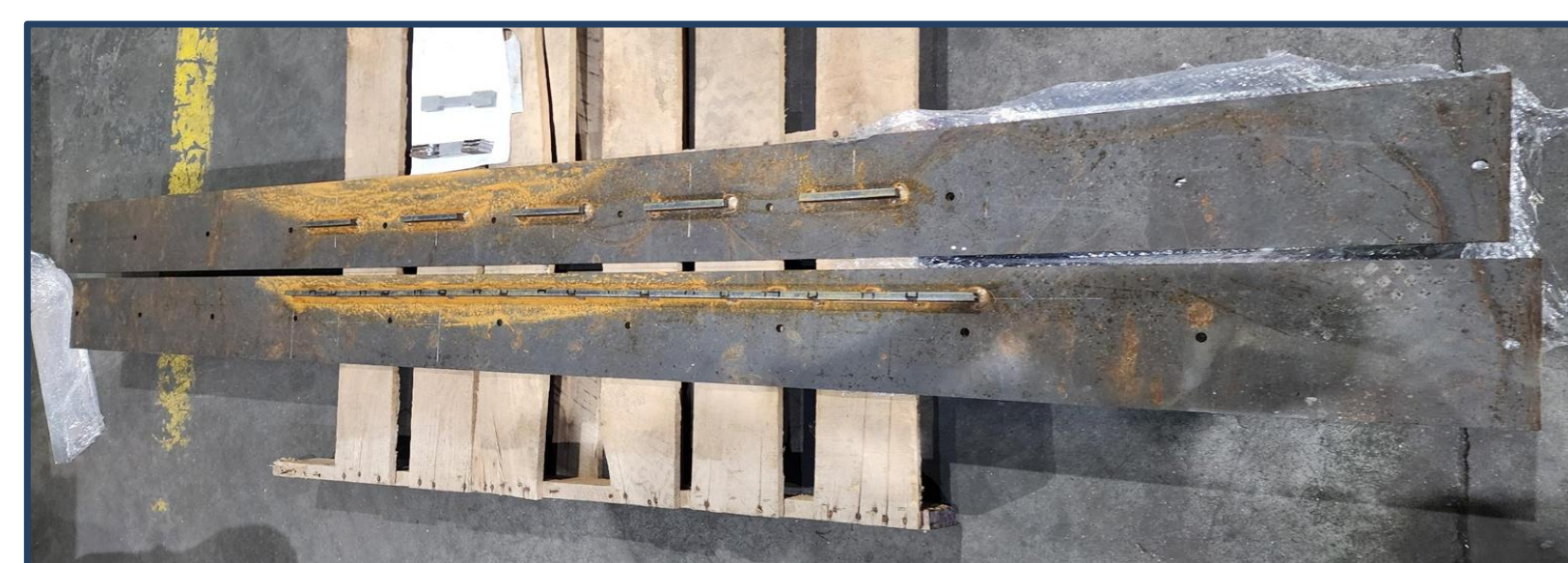
## Thermal Spray Process and Importance

- Thermal Spray Non-skid (TSN) acts as an aluminum based primer to slow down corrosion.
- The ability to apply TSN to more systems and equipment decreases maintenance, increases performance and longevity.

## Cost Savings



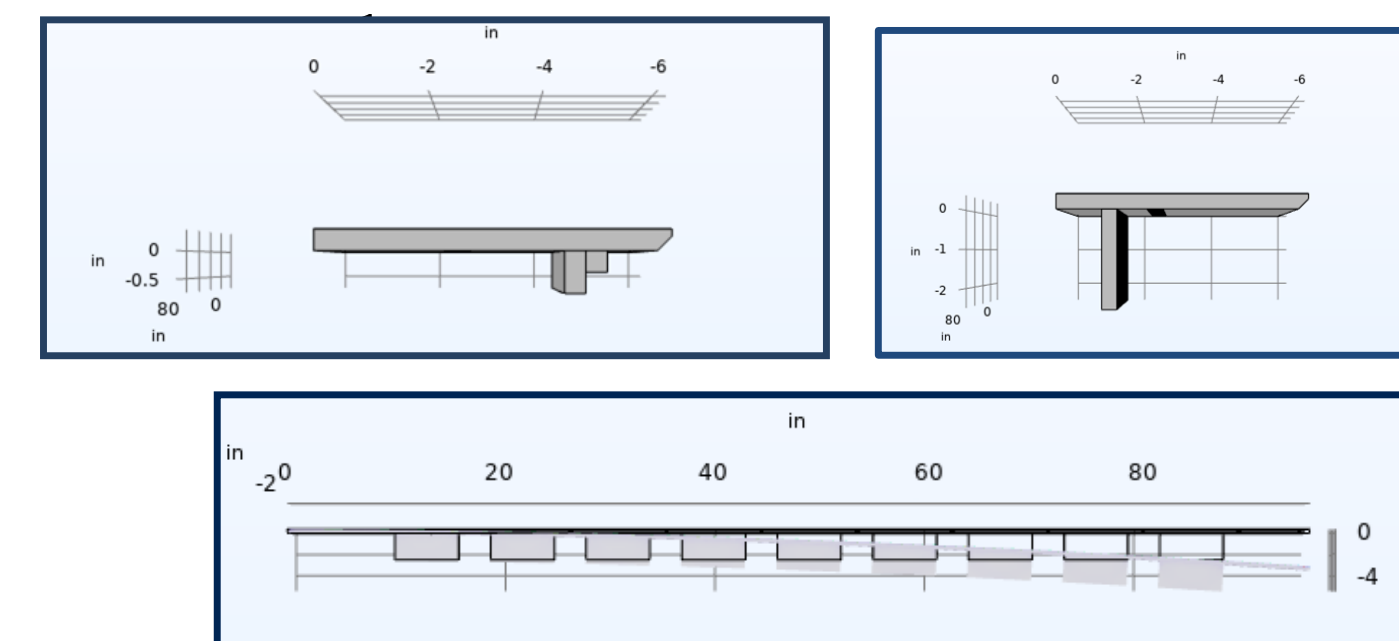
Thermal spray is estimated to **double the service life** and hence **reduce costs and maintenance time**.



## Testing & Evaluation

Used COMSOL to develop models

- Ultimate tensile stress used to determine heat applied to plate.
- Modelled plate under applied heat conditions.
- Three models generated.
  - $3/8'' \times 3/4'' \times 95''$  bar
  - Six  $3/8'' \times 1\ 1/2'' \times 6''$  sectioned pieces
  - $3/8'' \times 3/4'' \times 95''$  and  $3/8'' \times 3/8'' \times 95''$  bars welded next to each



Dimensions (in)	Estimated Deflection (in)	Est. Mass (lbm)
$3/8 \times 3/4$	0.179	x
$3/8 \times 1\ 1/2 \times 6$ (6 bars)	0.365	y
$3/8 \times 3/4$ and $3/8 \times 3/8$	0.169	z

## Final Design

- $3/4'' \times 3/8'' \times 48''$ .
- Tested on USS BULKELEY.
- Verified track fit and clearance for TSN to be applied.



Control plate with TSN, string demonstrates deflection ( $>1/8''$ )

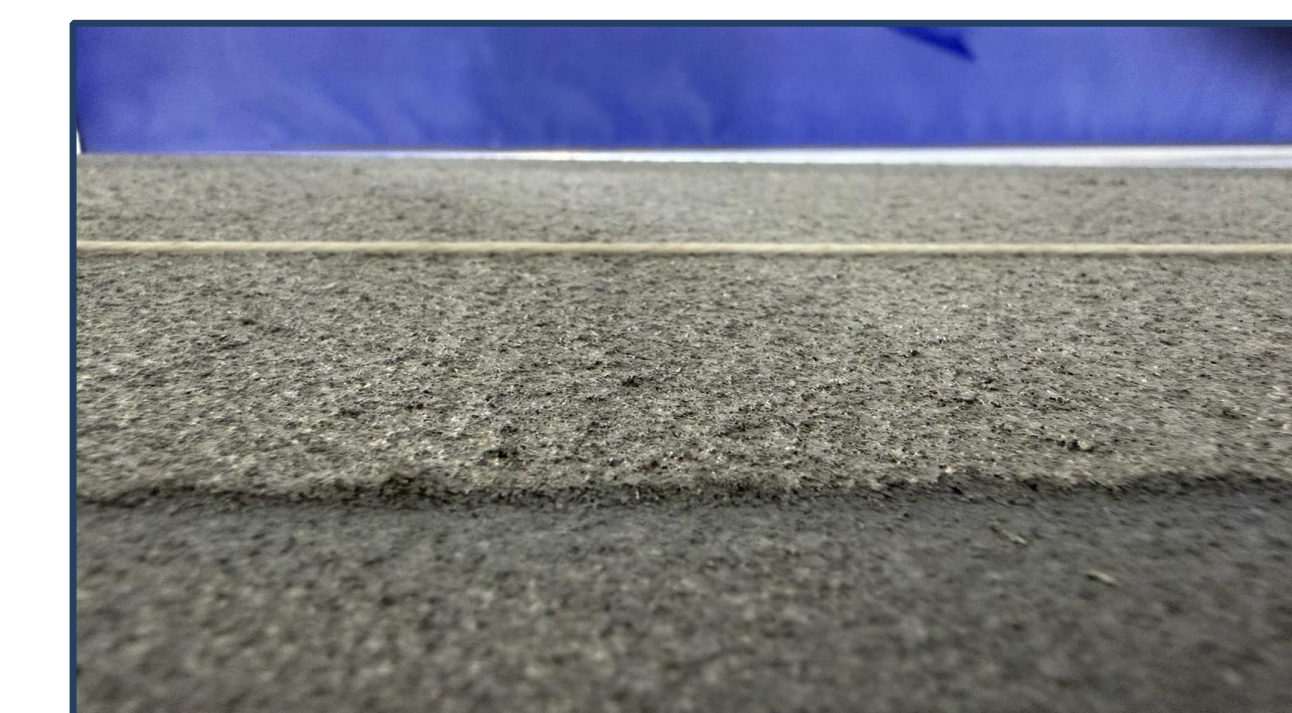


Plate with stiffeners and TSN, string demonstrates deflection ( $<1/8''$ )

Final Engineering Characteristic	Single Bar
Deflection (in)	$<1/8$
Mass (lbm)	3.81
Constructability (hrs) *estimation	1
Coef. of Thermal Expansion ( $/^{\circ}F$ )	12.3E-6
Cost* (USD) *manufacturing a single plate	\$2,100

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