Comparative Studies: *Grit Blasting* and *Bristle Blasting* Processes for Field Pipeline Surface Preparation

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## **Presentation Summary**

Surface Preparation Tools/Processes: FJC and CFR

II Functional Aspects of Grit Blast and Bristle Blast Processes Grit Blast Bristle Blast

### III Comparative Studies: Bristle Blast and Grit Blast Processes

- Surface cleanliness Weld cleaning Texture/anchor profile Residual stress state
- **IV** Summary/Conclusion

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Acknowledgment/Questions/Discussion





- Key Issues: ► Texture/anchor profile
  - compressive residual stress (enhanced life, SCC resistance) ?



clean and profile in one step ?

- Key Issues: ► negligible thermal loading ?
  - compressive residual stress (enhanced life, SCC resistance) ?

### II. Functional Aspects of Grit Blast and Bristle Blast Processes







### apparatus





II. Functional Aspects of Grit Blast and Bristle Blast Processes

## **Grit Blast Process**





mechanics/morphology

# II. Functional Aspects of Grit Blast and Bristle Blast Processes **Grit Blast Process** $2 \alpha$ Target Surface substrate morphology

## **Bristle Blast Process**

II. Functional Aspects of Grit Blast and Bristle Blast Processes



### apparatus



mechanics



### mechanics/morphology



### morphology



[left top] As-received corroded pipe section having severe corrosion [right] **bristle blast** treated surface (top).



SSPC-SP 10 (near-white blast cleaning) SSPC-SP 5 (white metal blast cleaning)









#### III. Comparative Studies: Bristle Blast and Grit Blast Processes Residual stress state



### **Bristle Blast**



Surface/subsurface deformation

### **III.** Comparative Studies: **Residual stress state Bristle Blast and Grit Blast Processes** Corrected Stress vs. Depth 20 σz 10 0 (≡**σ**<sub>x</sub> 0 Corrected Stress (ksi) -10 -20 **Bristle Blast** -30 -40 $σ_y$ (= $σ_T$ ) -50





Residual stresses measured using x-ray diffraction [ABS-A bristle blast surface]

#### **III.** Comparative Studies: **Residual stress state Bristle Blast and Grit Blast Processes Bristle Blast** Corrected Stress vs. Depth 20 10 0.10 mm 0 Ö Stress (ksi) -10 100 Corrected -20 MPa 200 -30 0.10 mm -40 - ABS-A Transverse 300 ABS-A Longitudinal -50 600 200 100 300 400 500 600

Depth (microns)

## **IV. Summary and Conclusion**

## Grit blast and Bristle blast processes

... Relevance for Field Joint Coating (FJC) and Coating Field Repair (CFR) operations

- Process Mechanics/Surface Morphology
- Cleanliness
- Texture/Anchor Profile
- Residual Stress State

## Discussion

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