

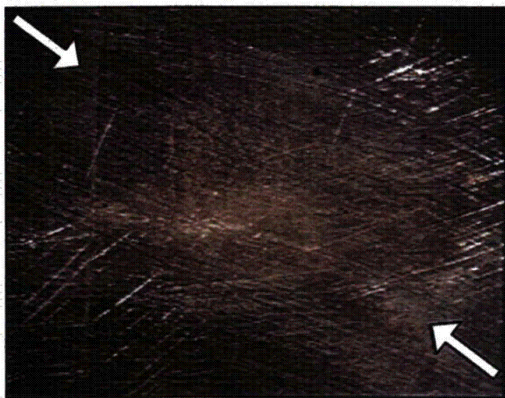
Sample 8 – Unpolished – 125- μ m Crack Opening Dimension



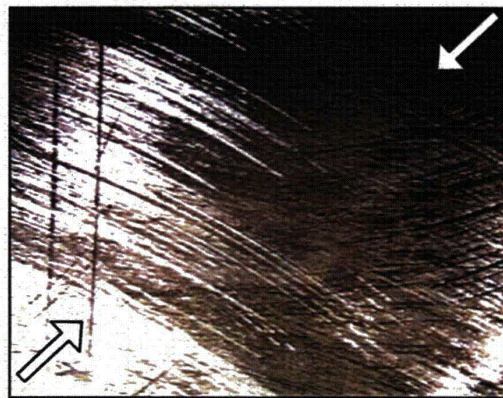
**Figure B.145 - Sample 8
Diffuse On-Axis Lighting**



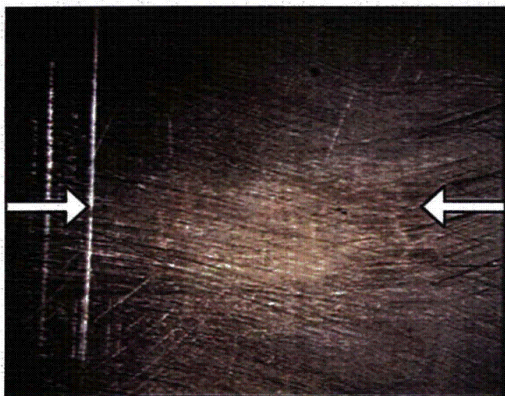
**Figure B.146 - Sample 8
Diffuse Ring Lighting**



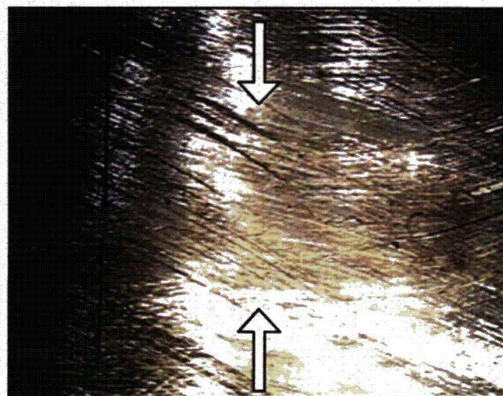
**Figure B.147 - Sample 8
Spotlighting from Indicated Directions**



**Figure B.148 - Sample 8
Spotlighting from Indicated Directions**



**Figure B.149 - Sample 8
Spotlighting from Indicated Direction**



**Figure B.150 - Sample 8
Spotlighting from Indicated Direction**

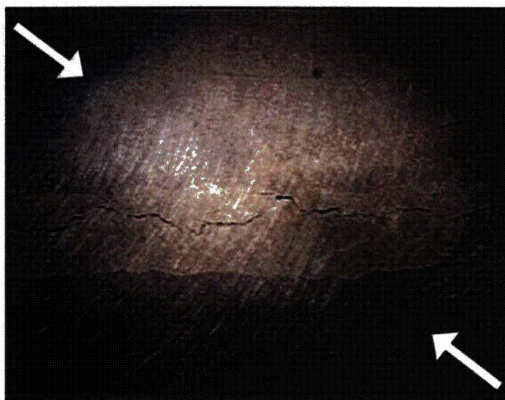
Sample 8 – Polished – 125- μ m Crack Opening Dimension



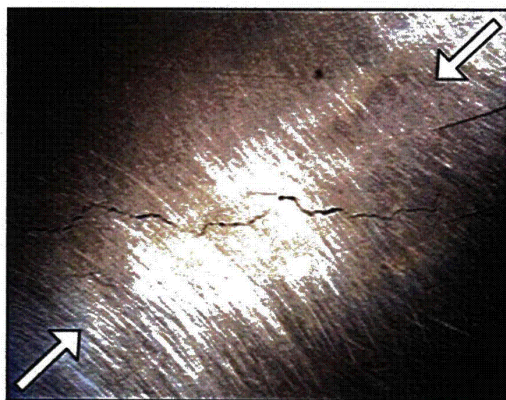
**Figure B.151 - Sample 8
Diffuse On-Axis Lighting**



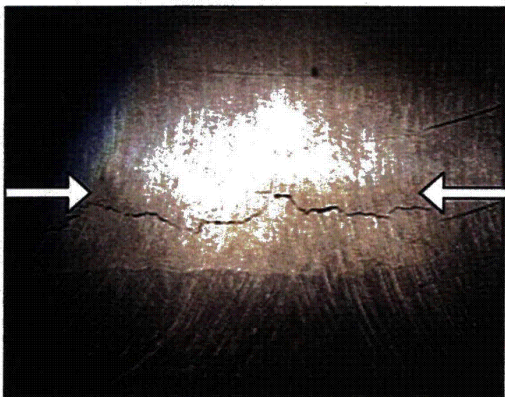
**Figure B.152 - Sample 8
Diffuse Ring Lighting**



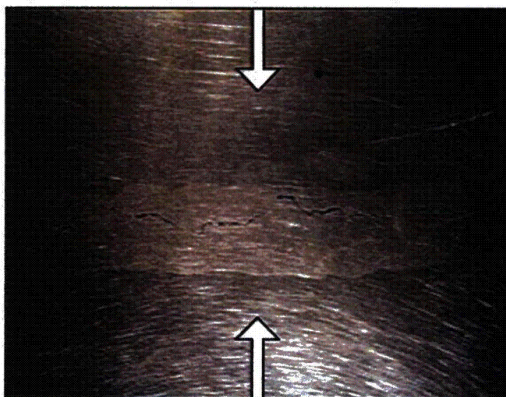
**Figure B.153 - Sample 8
Spotlighting from Indicated Directions**



**Figure B.154 - Sample 8
Spotlighting from Indicated Directions**



**Figure B.155 - Sample 8
Spotlighting from Indicated Direction**



**Figure B.156 - Sample 8
Spotlighting from Indicated Direction**

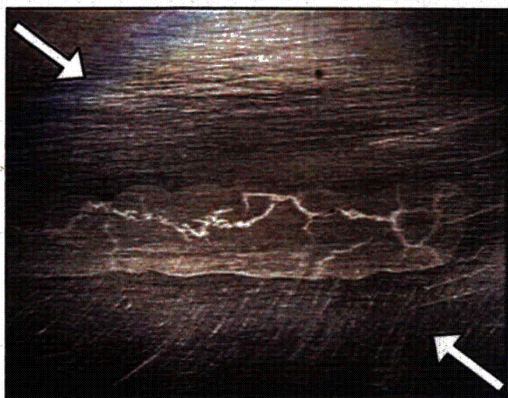
Sample 8 – Horizontal Scratching – 125- μ m Crack Opening Dimension



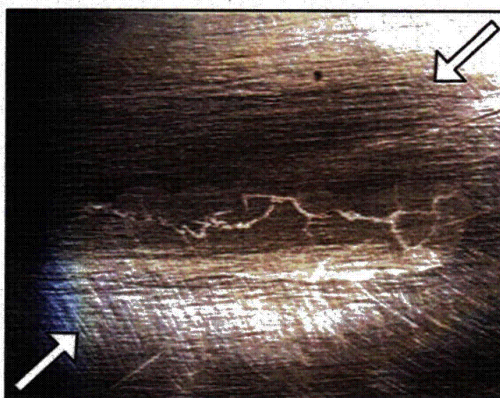
**Figure B.157 - Sample 8
Diffuse On-Axis Lighting**



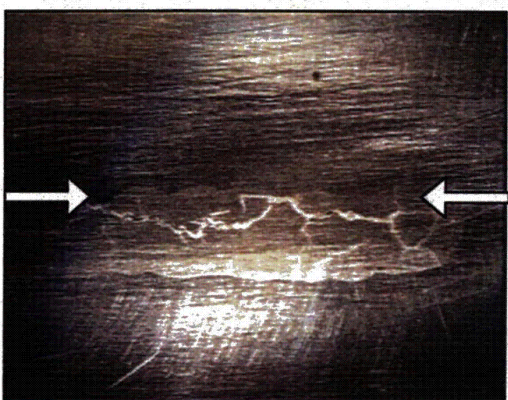
**Figure B.158 - Sample 8
Diffuse Ring Lighting**



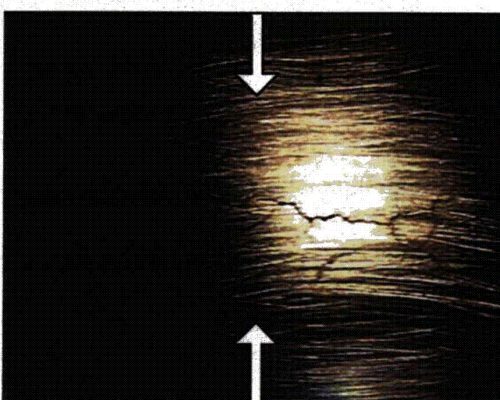
**Figure B.159 - Sample 8
Spotlighting from Indicated Directions**



**Figure B.160 - Sample 8
Spotlighting from Indicated Directions**



**Figure B.161 - Sample 8
Spotlighting from Indicated Direction**

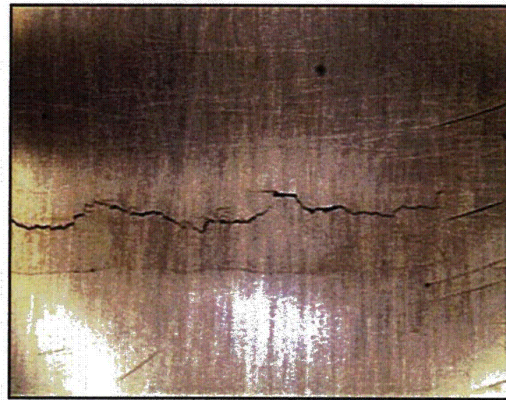


**Figure B.162 - Sample 8
Spotlighting from Indicated Direction**

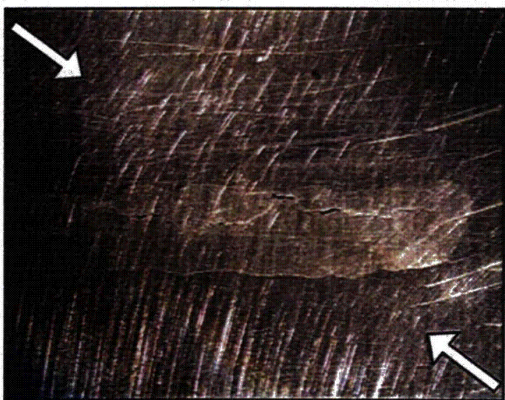
Sample 8 – Vertical Scratching – 125- μ m Crack Opening Dimension



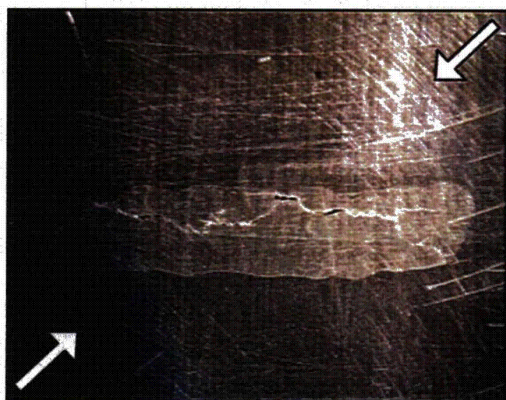
**Figure B.163 - Sample 8
Diffuse On-Axis Lighting**



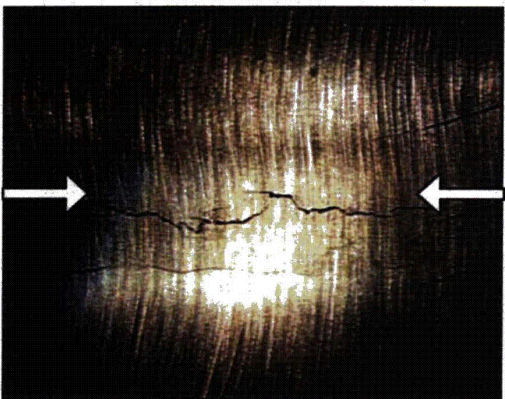
**Figure B.164 - Sample 8
Diffuse Ring Lighting**



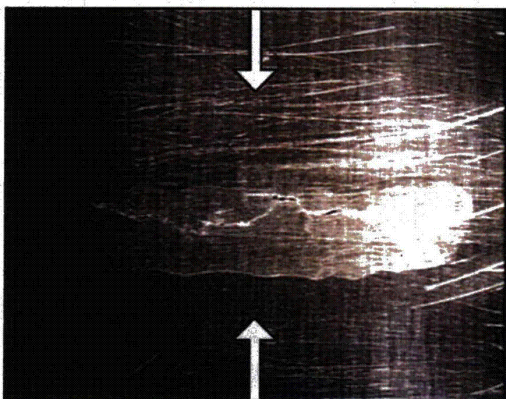
**Figure B.165 - Sample 8
Spotlighting from Indicated Directions**



**Figure B.166 - Sample 8
Spotlighting from Indicated Directions**

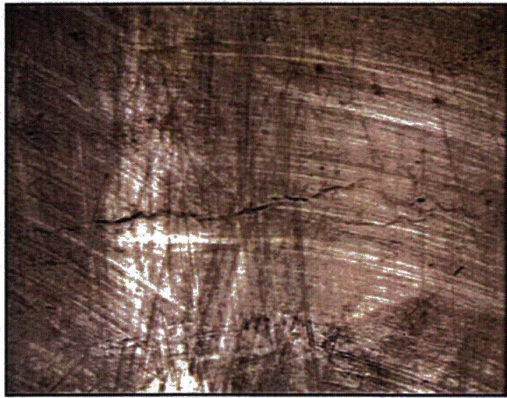


**Figure B.167 - Sample 8
Spotlighting from Indicated Direction**



**Figure B.168 - Sample 8
Spotlighting from Indicated Direction**

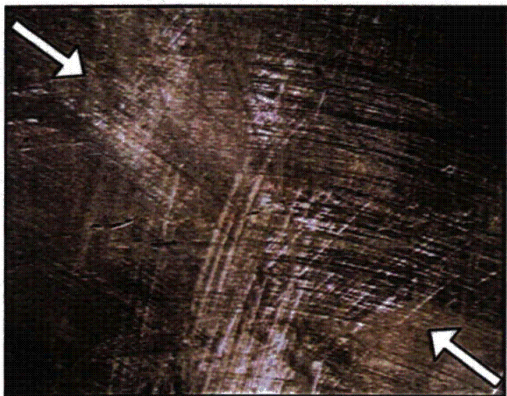
Sample 9 – Unpolished – 125- μ m Crack Opening Dimension



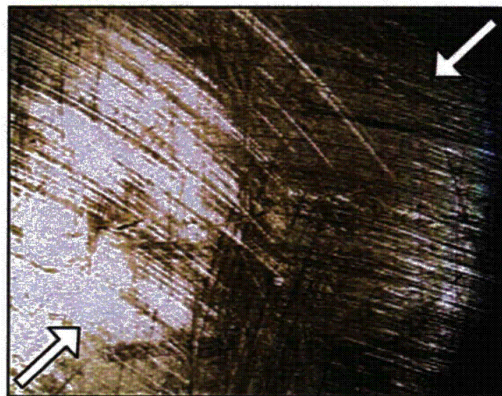
**Figure B.169 - Sample 9
Diffuse On-Axis Lighting**



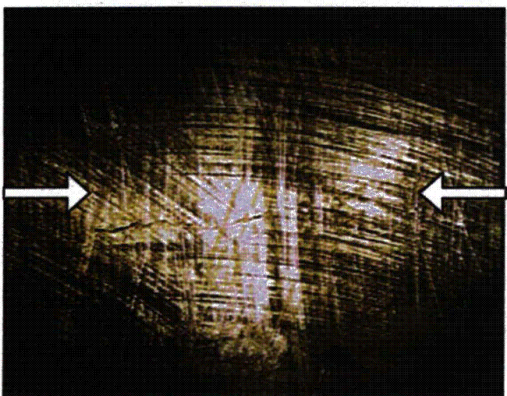
**Figure B.170 - Sample 9
Diffuse Ring Lighting**



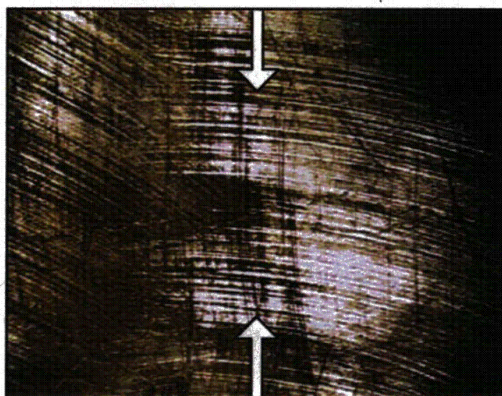
**Figure B.171 - Sample 9
Spotlighting from Indicated Directions**



**Figure B.172 - Sample 9
Spotlighting from Indicated Directions**



**Figure B.173 - Sample 9
Spotlighting from Indicated Direction**



**Figure B.174 - Sample 9
Spotlighting from Indicated Direction**

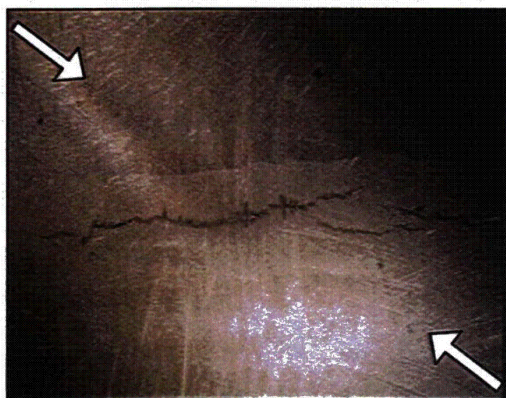
Sample 9 – Polished – 125- μ m Crack Opening Dimension



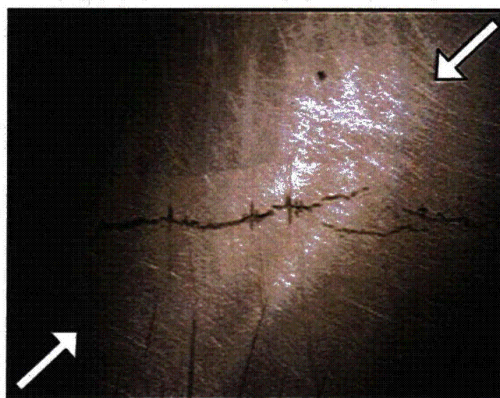
**Figure B.175 - Sample 9
Diffuse On-Axis Lighting**



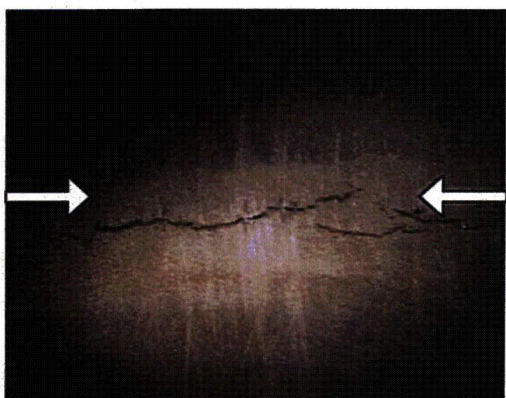
**Figure B.176 - Sample 9
Diffuse Ring Lighting**



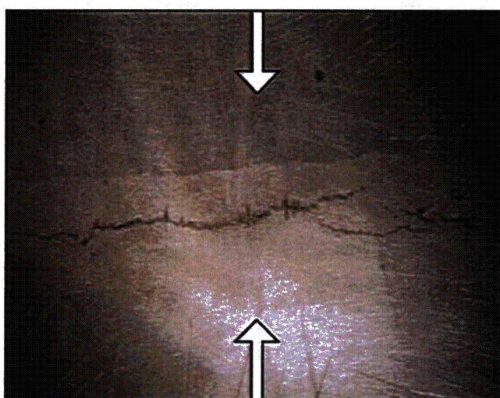
**Figure B.177 - Sample 9
Spotlighting from Indicated Directions**



**Figure B.178 - Sample 9
Spotlighting from Indicated Directions**



**Figure B.179 - Sample 9
Spotlighting from Indicated Direction**



**Figure B.180 - Sample 9
Spotlighting from Indicated Direction**

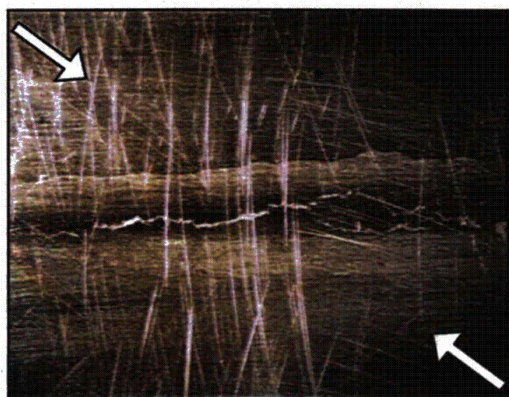
Sample 9 – Horizontal Scratching – 125- μ m Crack Opening Dimension



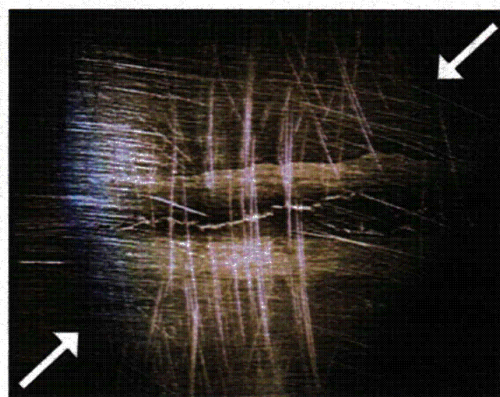
**Figure B.181 - Sample 9
Diffuse On-Axis Lighting**



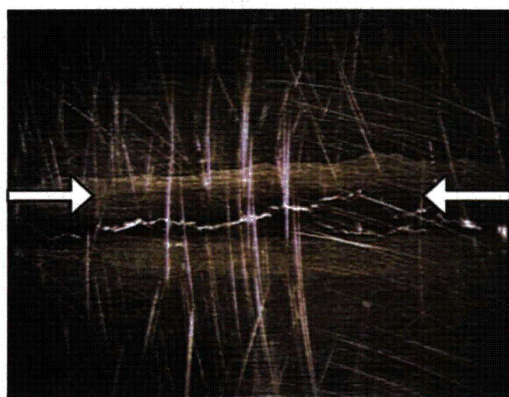
**Figure B.182 - Sample 9
Diffuse Ring Lighting**



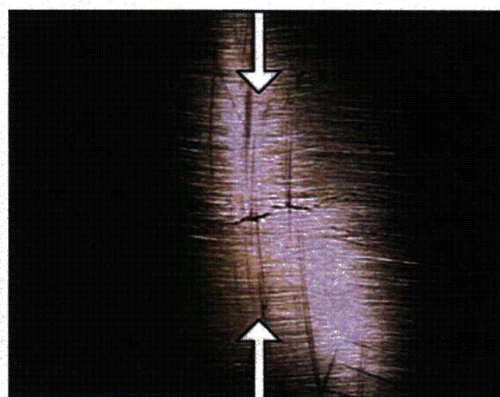
**Figure B.183 - Sample 9
Spotlighting from Indicated Directions**



**Figure B.184 - Sample 9
Spotlighting from Indicated Directions**

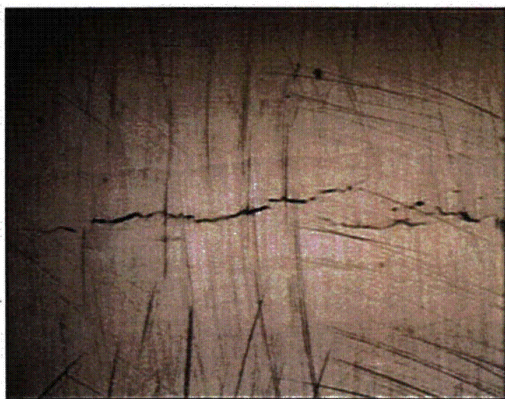


**Figure B.185 - Sample 9
Spotlighting from Indicated Direction**

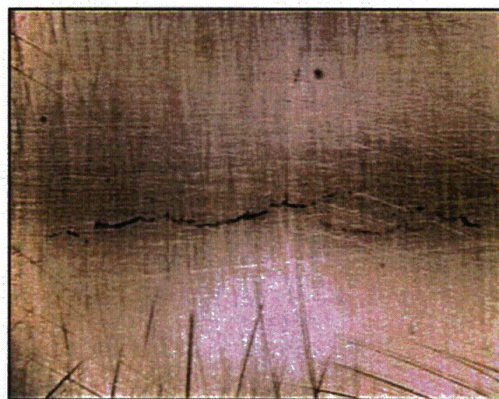


**Figure B.186 - Sample 9
Spotlighting from Indicated Direction**

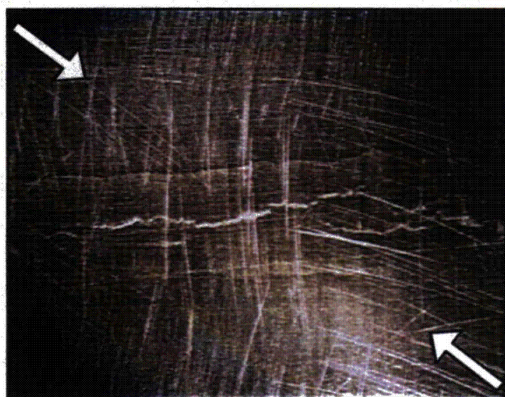
Sample 9 – Vertical Scratching – 125- μ m Crack Opening Dimension



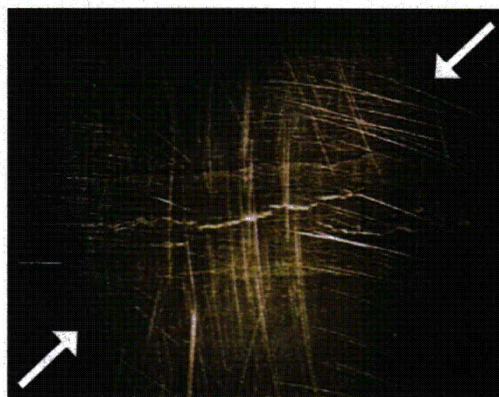
**Figure B.187 - Sample 9
Diffuse On-Axis Lighting**



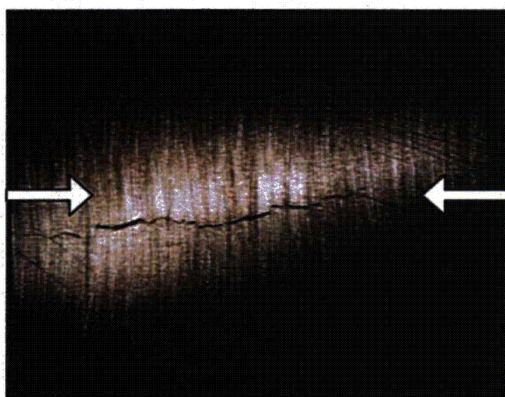
**Figure B.188 - Sample 9
Diffuse Ring Lighting**



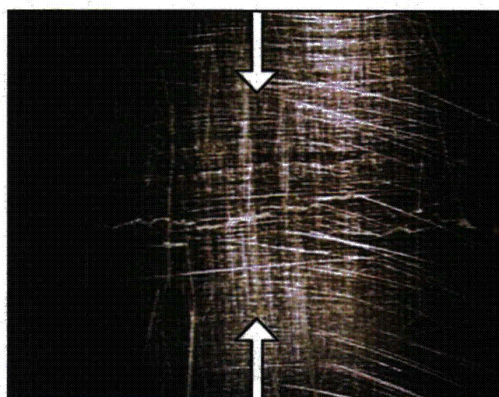
**Figure B.189 - Sample 9
Spotlighting from Indicated Directions**



**Figure B.190 - Sample 9
Spotlighting from Indicated Directions**



**Figure B.191 - Sample 9
Spotlighting from Indicated Direction**



**Figure B.192 - Sample 9
Spotlighting from Indicated Direction**

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11. ABSTRACT (200 words or less) The U.S. Nuclear Regulatory Commission Office of Nuclear Regulatory Research funded a multiyear program at the Pacific Northwest National Laboratory (PNNL) to evaluate the reliability and accuracy of nondestructive evaluation techniques employed for inservice inspection. Recently, the U.S. nuclear industry proposed replacing current volumetric and/or surface examinations of certain components in commercial nuclear power plants, as required by the American Society of Mechanical Engineers Boiler and Pressure Vessel Code Section XI, "Inservice Inspection of Nuclear Power Plant Components," with a simpler visual testing (VT) method. The advantages of VT are that these tests generally involve much less radiation exposure and time to perform the examination than do volumetric examinations such as ultrasonic testing. The issues relative to the reliability of VT in determining the structural integrity of reactor components were examined. PNNL conducted a parametric study that examined the important variables influencing the effectiveness of a remote visual test. Tested variables included lighting techniques, camera resolution, camera movement, and magnification. PNNL also conducted a limited laboratory test using a commercial visual testing camera system to experimentally determine the ability of the camera system to detect cracks of various widths under ideal conditions. The results of these studies and their implications are presented in this report.					
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