# Corrosion level measurement

## 3D Scans

|  |  |
| --- | --- |
| C:\ConditionDependentPBEE\ExperimentalProgram\3D Scans\PIX\CL15_BBT2.tif | C:\ConditionDependentPBEE\ExperimentalProgram\3D Scans\PIX\CL20_BBT5.tif |
| a)3D scan of CL=15% | b) 3D scan of CL=20% |

# Tensions Tests

## Yield strength as a function of corrosion

|  |  |  |
| --- | --- | --- |
| Q:\My Drive\PhD Program\Research\Corroded BBT\Pictures\Tension Tests\IMG_3205.jpg | Q:\My Drive\PhD Program\Research\Corroded BBT\Pictures\Tension Tests\IMG_3211.jpg | Q:\My Drive\PhD Program\Research\Corroded BBT\Pictures\Tension Tests\IMG_3211.jpg |
| 1. Test setup | 1. Fractured specimen | 1. Low necking at fracture section |

## Effect of corrosion in uniform elongation

# Buckled Bar Tension (BBT) Tests

## Summary of test procedure

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|  |  |
| 1. Test setup | 1. Bar loaded in UTM |
|  |  |
| 1. Buckled bar in compression loading | 1. Fractured bar |

|  |  |
| --- | --- |
| C:\ConditionDependentPBEE\Thesis\VAC Thesis 2.0\Chapter-4\figs\BBT_Brittle.JPG | C:\ConditionDependentPBEE\Thesis\VAC Thesis 2.0\Chapter-4\figs\BBT_Ductile.JPG |
| 1. Brittle failure | 1. Ductile failure |

|  |  |
| --- | --- |
|  |  |
| 1. Curvature of rebar at maximum bending strain | 1. Stress vs axial longitudinal strain |

## Effect of corrosion in Critical Bending Strain

## Effect of corrosion at the micro-structural level

**Fractography**

|  |  |  |
| --- | --- | --- |
| C:\ConditionDependentPBEE\Thesis\VAC Thesis 2.0\Chapter-4\figs\BrittleFailure.jpg  Granular fracture | C:\ConditionDependentPBEE\Thesis\VAC Thesis 2.0\Chapter-4\figs\ImpactLowDuctility.jpg  Cleavage fracture | C:\ConditionDependentPBEE\Thesis\VAC Thesis 2.0\Chapter-4\figs\1400xdimplescenter.123045.jpg  Dimpled fracture |
| 1. Brittle fracture features | | 1. Ductile fracture features |

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Observation Location** | **Brittle failure** | **Ductile Failure** |
| **Fracture Initiation** |  |  |  |
| **Center** |  |  |  |
| **Oposite extreme** |  |  |  |

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**River like fracture surfaces**

**Spectrum analysis**

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| --- | --- |
| **Brittle** | **Ductile** |
|  |  |
| 1. BSE image of fracture surface brittle sample | 1. BSE image of fracture surface ductile sample |
| **C:\ConditionDependentPBEE\ExperimentalProgram\SEM\Spectrum Figures\Spectrum1.png** | C:\ConditionDependentPBEE\ExperimentalProgram\SEM\Spectrum Figures\Spectrum5.png |
| 1. Spectrum analysis in brittle sample | 1. Spectrum analysis in ductile sample |

## Effect of geometry imperfections