BIT Inspection Technology

(NDT/ Weld Inspection Training / Consultancy/ Third Party Inspection)

1. Abstract

Gap analysis performed to distinguish echo response between **Centre Crack** and **Cluster Porosity**

2. Reference documents

- **EN 1713** - UT characterization of indication

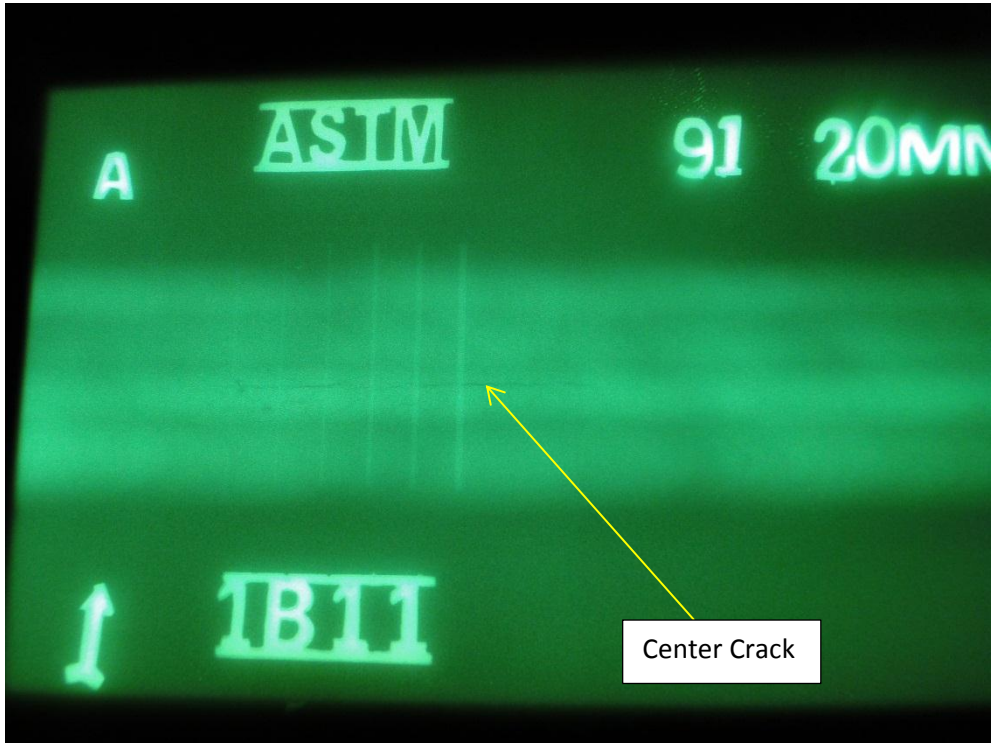
3. Gap Analysis Reference

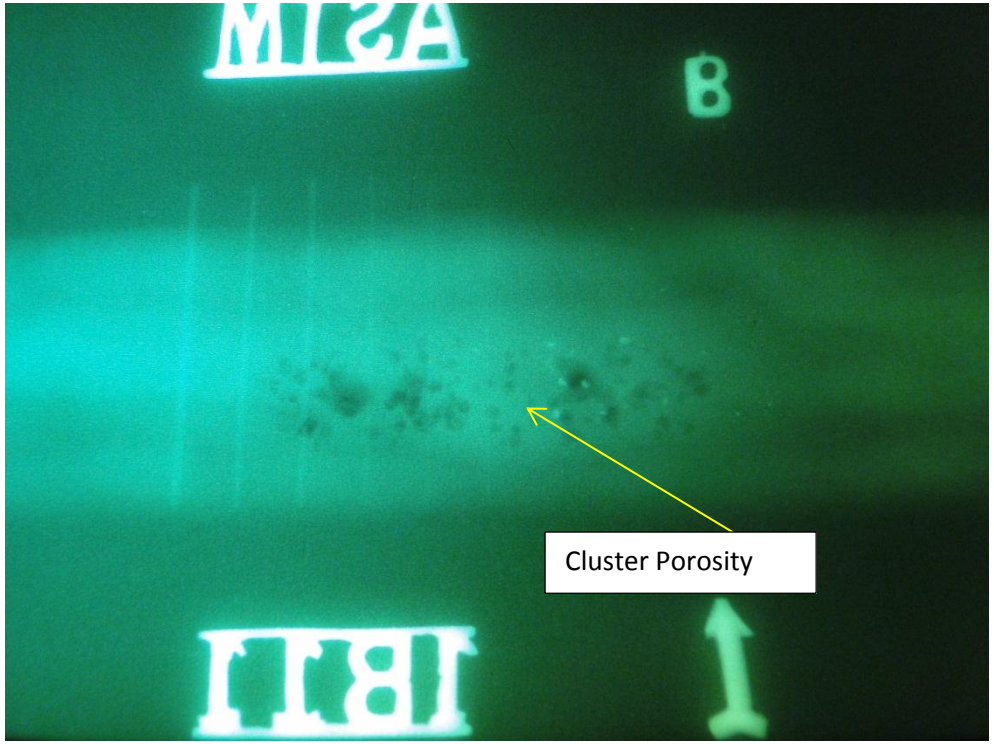
- **20mm thick** weld plate with **Centre Crack** and **Cluster Porosity**
- Reference block : 38mm thick with **3mm SDH**
- Weld specimen material: **Carbon steel**
- Reference (DAC): **49 dB**

4. Parameter synchronized

- **Both Centre Crack and Cluster Porosity kept at same depth of approximately 8mm** from scanning surface in a 20mm thick weld plate in order to maintain **similar beam path and hence same material attenuation.**
- So echo response is only based on **type** and **orientation of defect**

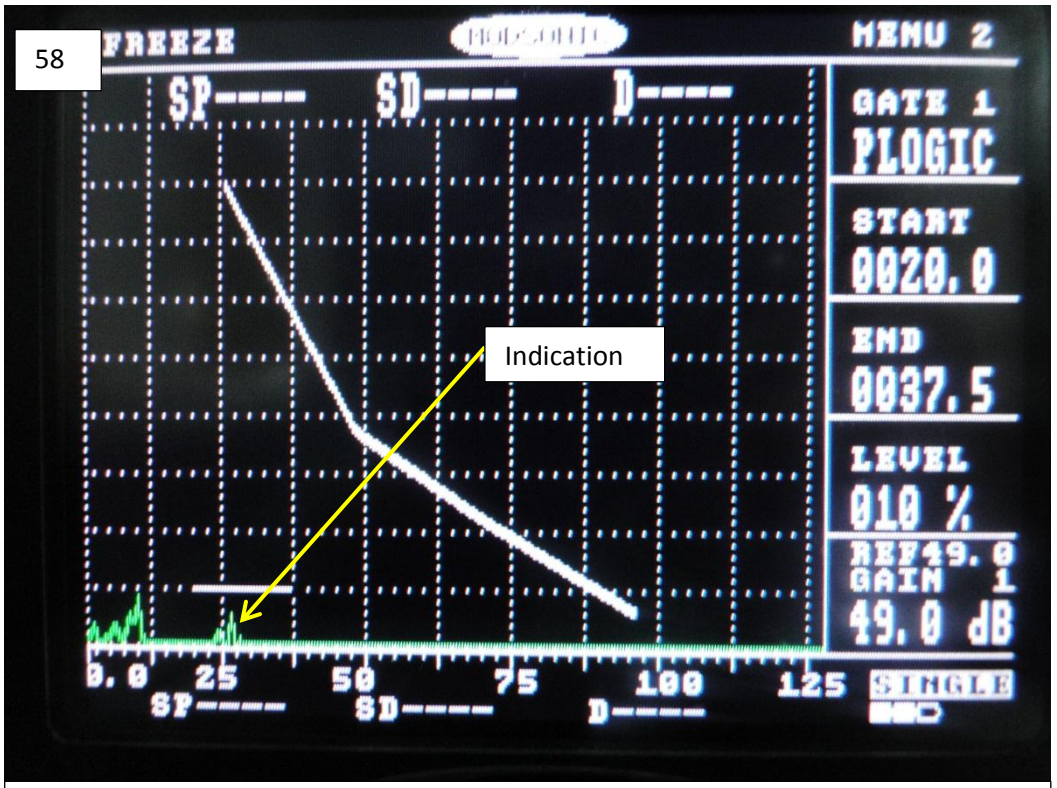
5. Radiographic image from 20mm thick weld plate with Center Crack and Cluster porosity





6. Echo response Center Crack and Cluster porosity @ reference 49 dB

Center Crack response @ DAC (49db)



Cluster porosity response @ DAC (49db)

Observation:

Parameters	Center Crack	Cluster Porosity	Remarks
Amplitude % FSH	8	5	
Time base width in mm	2	5	

7. Echo response Center Crack and Cluster porosity @ reference 49 dB + 6dB

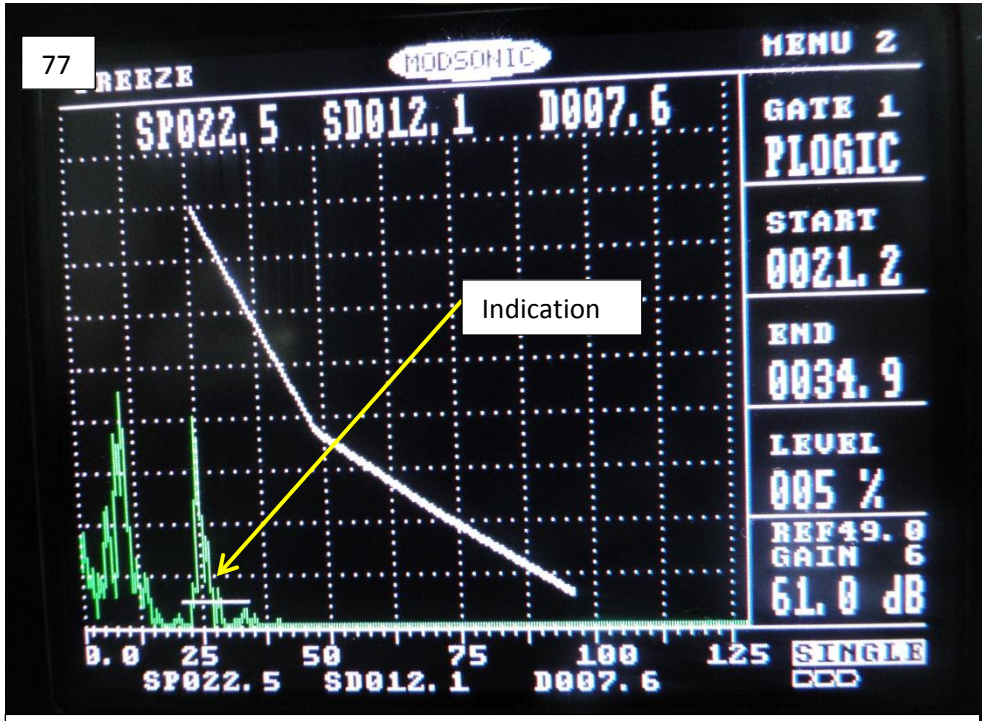
Center Crack response @ DAC (49db) + 6 db

Cluster porosity response @ DAC (49db) + 6 db

Observation:

Parameters	Center Crack	Cluster Porosity	Remarks
Amplitude % FSH	20	12	
Time base width in mm	5	8	

8. Echo response Center Crack and Cluster porosity @ reference 49 dB + 12dB



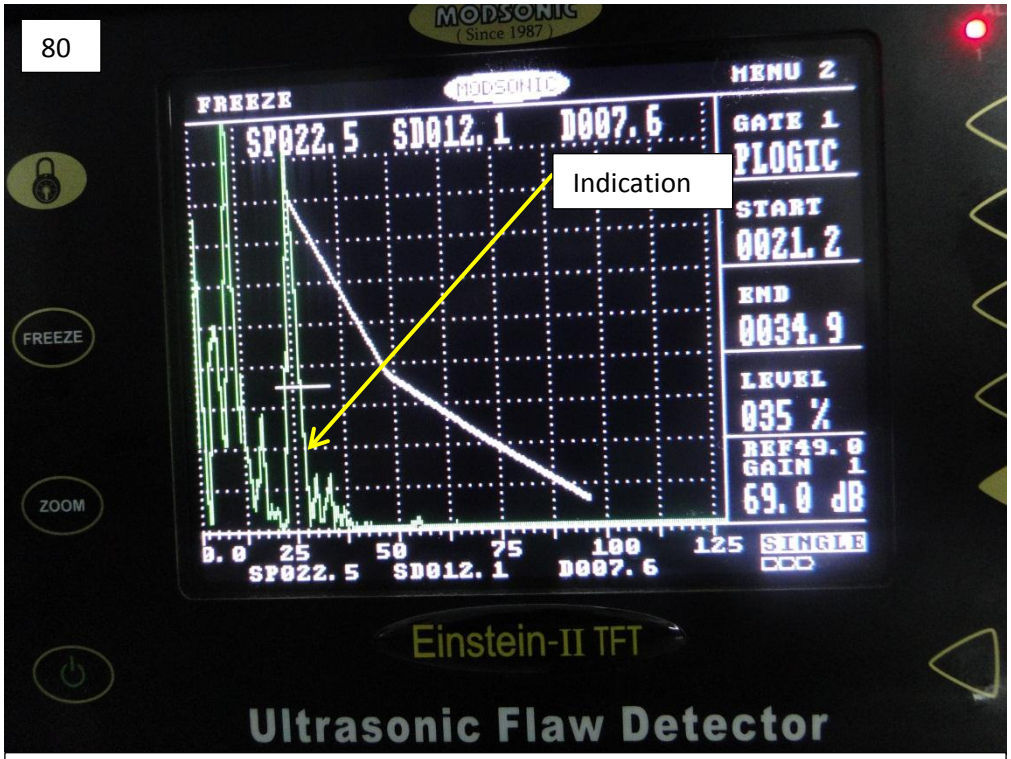
Center Crack response @ DAC (49db) + 12 db

Cluster porosity response @ DAC (49db) + 12 db

Observation:

Parameters	Center Crack	Cluster Porosity	Remarks
Amplitude % FSH	40	32	
Time base width in mm	5	10	Ignored noise amplitude up to 5% FSH

9. Echo response Center Crack and Cluster porosity @ reference 49 dB + 20dB



Center Crack response @ DAC (49db) + 20 db

Cluster porosity response @ DAC (49db) + 20 db

Observation:

Parameters	Center Crack	Cluster Porosity	Remarks
Amplitude % FSH	100	84	
Time base width in mm	5	10	1) Ignored noise amplitude up to 10% FSH 2) Noticed **many multiple echo** with amplitude height greater than 20 % FSH from Cluster Porosity 3) Noticed **only single echo** with amplitude height greater than 20 % FSH from Center Crack

10. Summery of observation

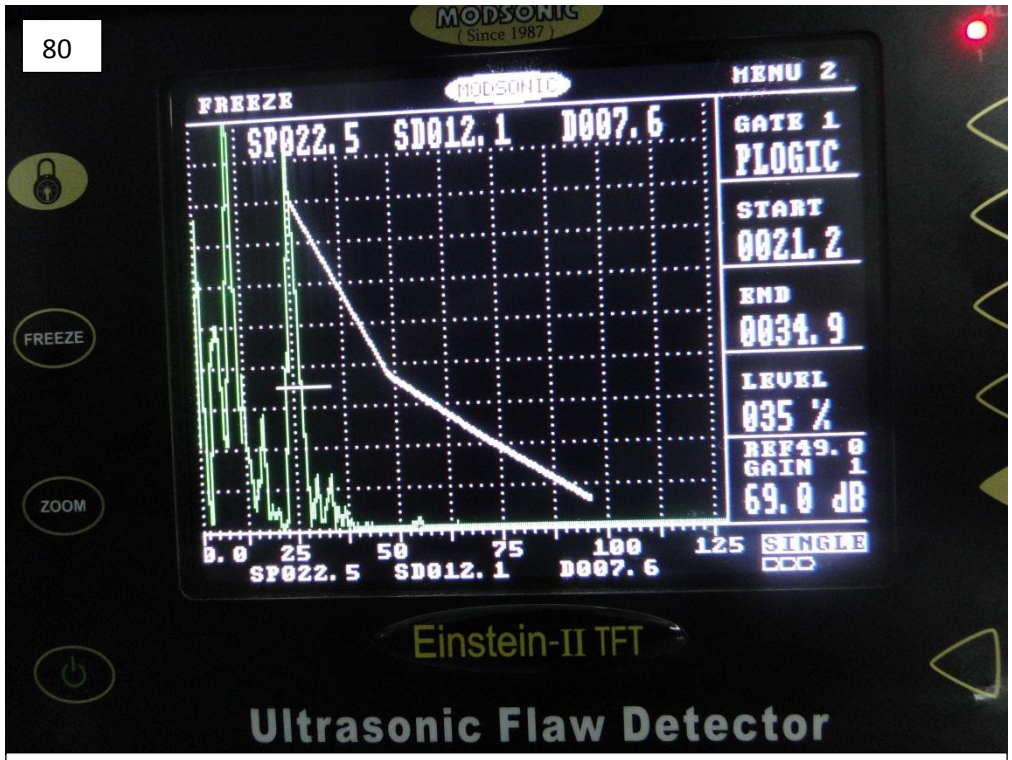
Parameters	Center Crack	Cluster Porosity	Remarks
Amplitude comparison			
Amplitude % FSH @ DAC	8	5	
Amplitude % FSH @ DAC + 6 dB	20	12	
Amplitude % FSH @ DAC + 12 dB	**40**	**32**	
Amplitude % FSH @ DAC + 20 dB	**100**	**84**	• Noticed **many multiple echo** with amplitude height greater than 20 % FSH from Cluster Porosity • Noticed **only single echo** with amplitude height greater than 20 % FSH from Center Crack
Time base comparison			
Time base width in mm @ DAC	2	5	
Time base width in mm @ DAC + 6 dB	5	8	
Time base width in mm @ DAC + 12 dB	**5**	**10**	Ignored noise amplitude up to **5% FSH**
Time base width in mm @ DAC + 20 dB	**5**	**10**	Ignored noise amplitude up to **10% FSH**

- Noticed **many multiple echo** with amplitude height greater than 20 % FSH from **Cluster Porosity**
- Noticed **only single echo** with amplitude height greater than 20 % FSH from **Center Crack**
- **We have taken these two echo pattern as worst case in terms of similarity in echo response, whereas most of the cases amplitude difference will be very obvious and quantified difference is approximately 6dB and above.**

11. Conclusion

- In case of Cluster Porosity, ultrasonic sound response has distributed to over a time –base up to 10mm whereas Centre crack is only 5mm and total energy response is not accumulated as like Centre Crack.

- **Based on difference in echo pattern, we can clearly emphasize to gentleman who challenges us.**



Center Crack response @ DAC (49db) + 20 db

Cluster porosity response @ DAC (49db) + 20 db