

Experiences and challenges faced during a new service roll out

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Background: The Regional Medical Physics Service in Northern Ireland (NI) started a new ultrasound physics support service in 2019. Experiences and challenges faced during this roll out are presented. Further discussions will include cases of repetitive faults on similar probes, rare faults and experiences from interactions with manufacturers. NI has 5 main Health and Social Care Trusts and there are 22 hospitals with specific radiology departments. The Ultrasound Physics Service was initiated by establishing an up-to-date inventory of scanners under all screening programmes (Breast Screening [BSP], Abdominal Aortic Aneurysm [AAA] and Fetal Anomaly) and of all radiology scanners. Acceptance and baseline testing was successfully completed on all screening programme scanners across NI. Radiology scanners were baselined and user QA programmes established across Belfast Health & Social Care Trust (This work is ongoing with the other Trusts). **Results from the baselined probes showed that approximately 35 % (39/111) of all probes tested had faults.**

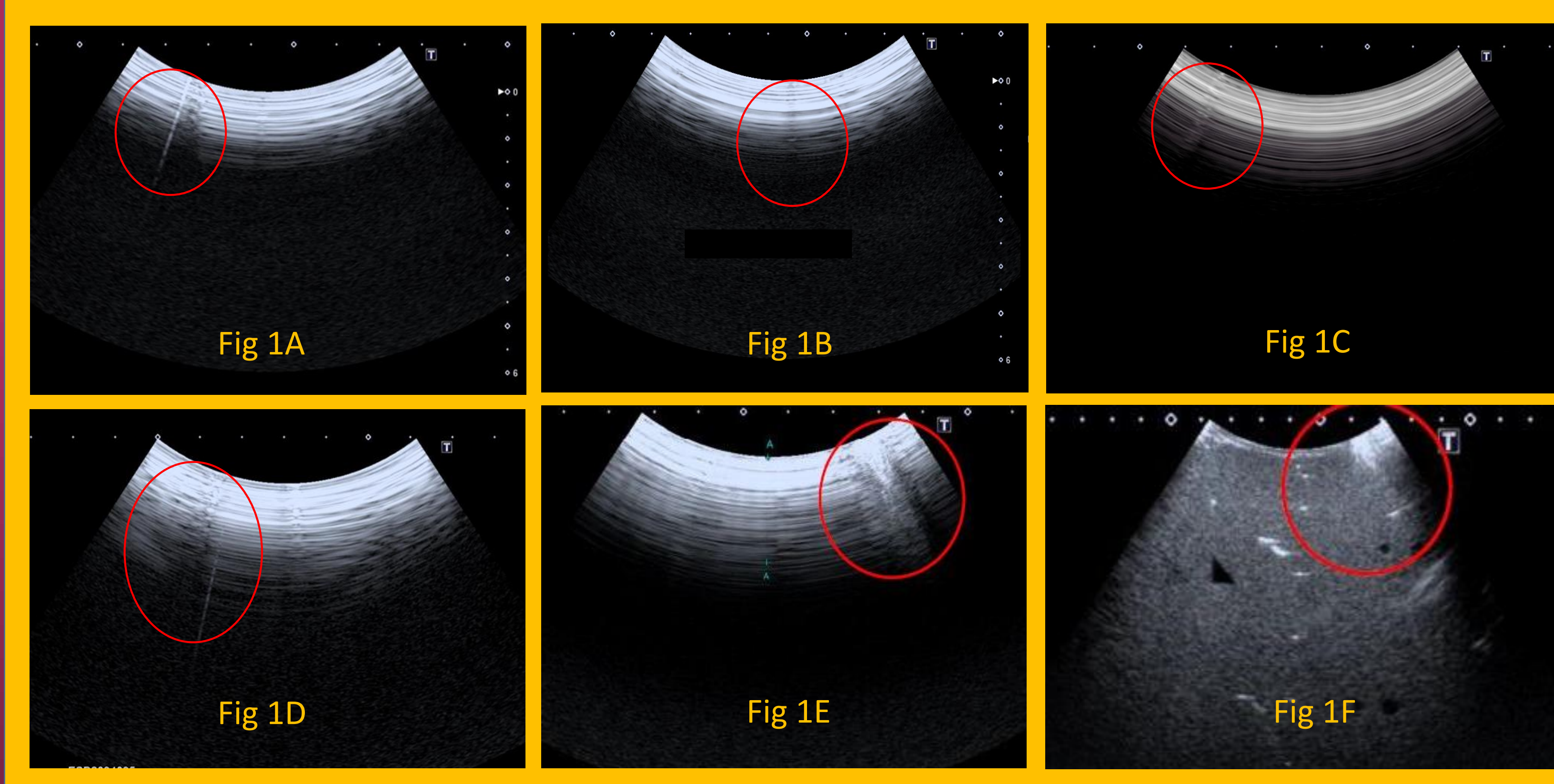


Figure:1A-1F 70% (7/10) of a particular type of probe from Manufacturer A were found to have major faults. Cable fault, shattered crystal and increased number of drop outs were some faults repeatedly noticed. Manufacturer replaced all faulty probes

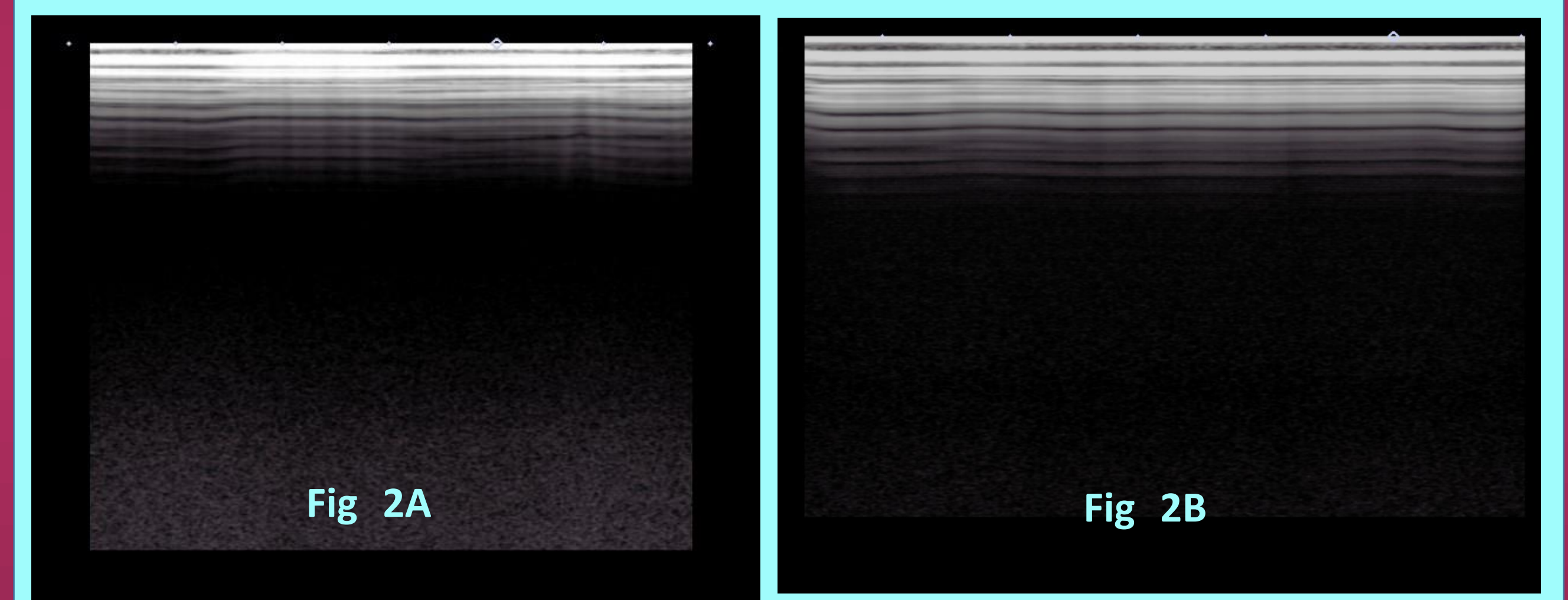


Figure:2A-2B: Variation in lens thickness noticed on 2 occasions on the same type of probes from Manufacturer A in BSP department. Manufacturer described this as a ghosting artefact and upon further request electronic testing was conducted. Results revealed faults with Probe A (replaced). Probe B had a few elements with weaker sensitivity, but was still within acceptable tolerance limits, and was not replaced.

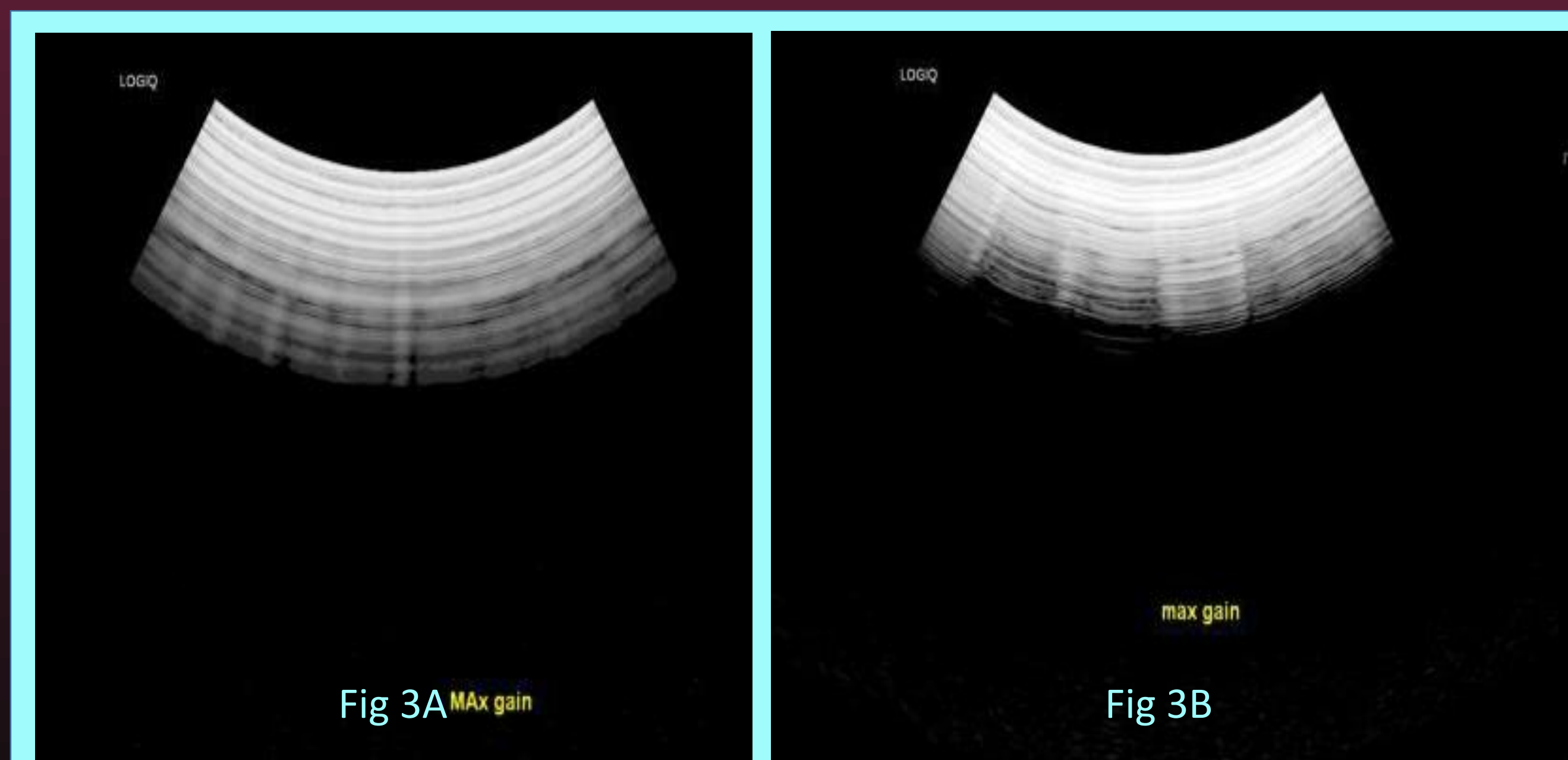


Figure: 3A-3B: Non-uniformities in reverberations and "washed out" appearance of images noted with one Probe from Manufacturer B. Probe was replaced, but fault was non-diagnosed.

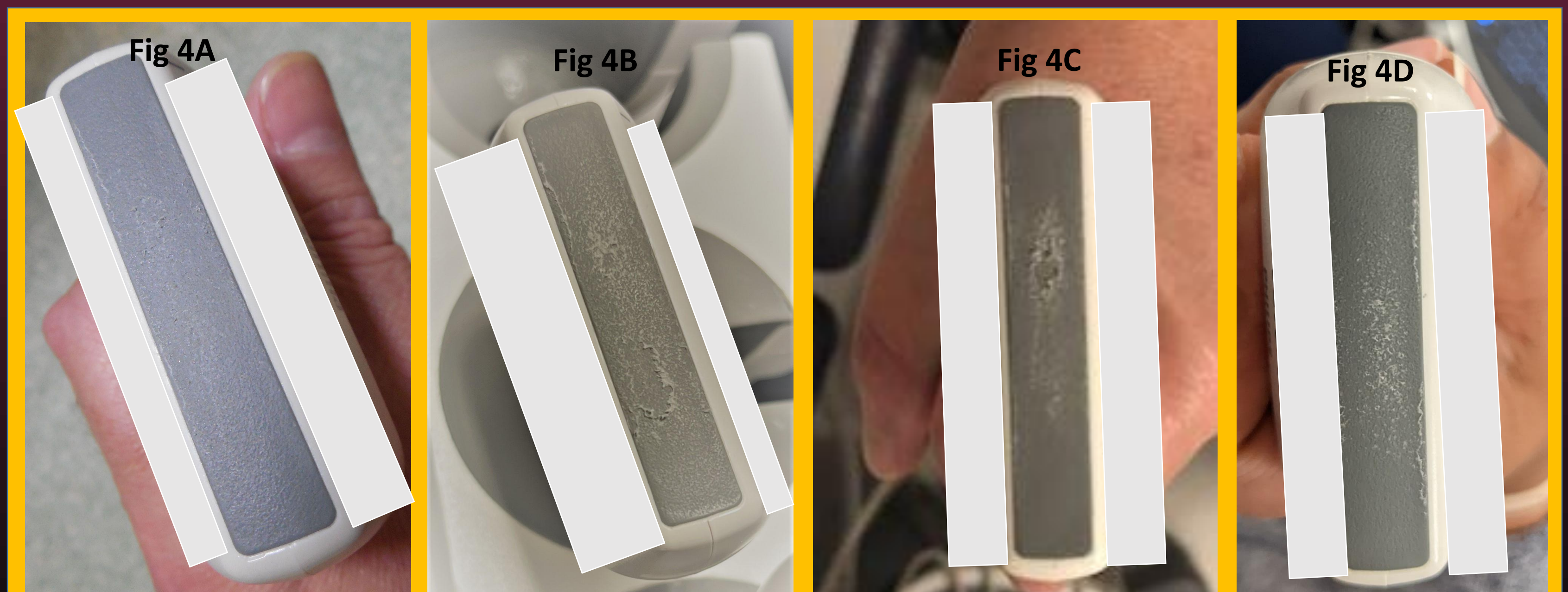


Figure: 4A-4D: 4 probes of a specific model from Manufacturer C were rejected due to similar damage to the surface coating making it impossible to clean adequately, hence presenting a cross contamination risk. All 4 probes replaced.

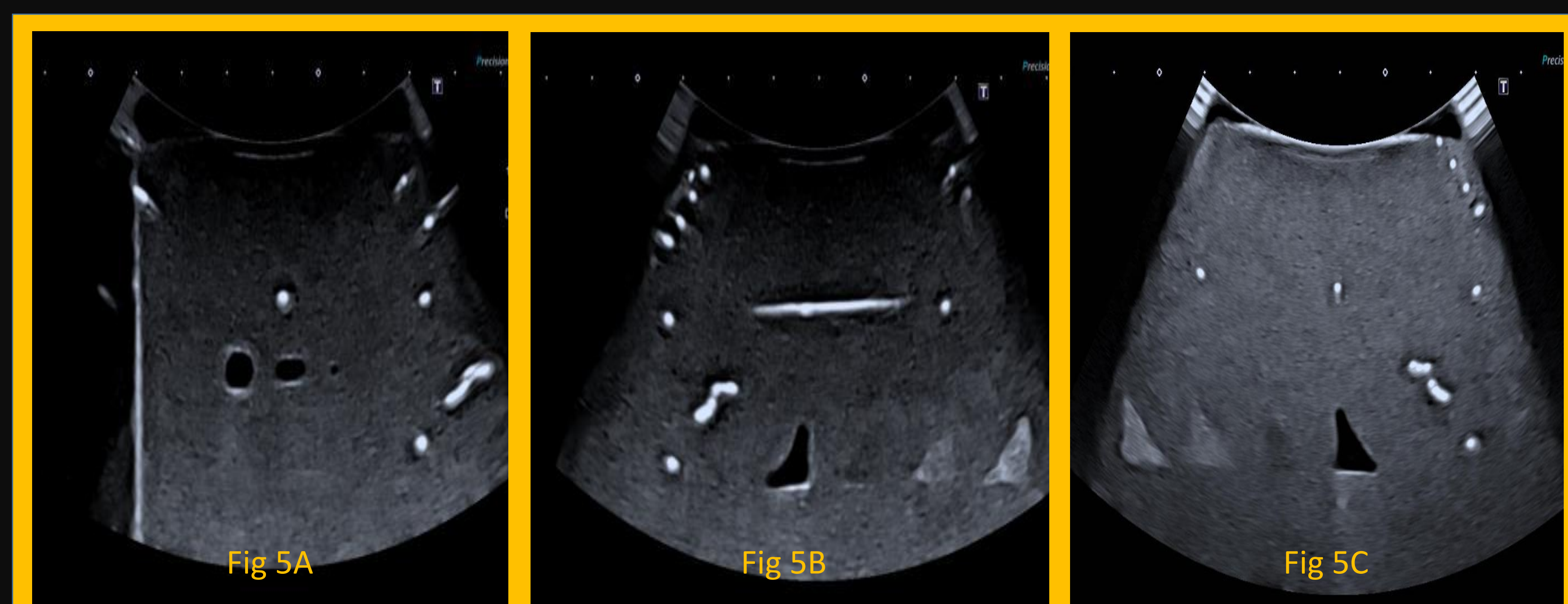


Figure: 5A-5C: Image distortion effect with speckle reduction imaging ON was noted on 2 probes of same model from Manufacturer A. Manufacturer quoted this as "a non-isotropic behaviour in the higher value speckle reduction algorithm with the tendency to "connect speckles" stronger in lateral than in axial direction. The bias this non-isotropic Imaging is introducing is within the tolerance of the claimed measurement accuracy for the ultrasound system". Probe not replaced.

Conclusion: Acceptance and Baseline testing protocols had to be adapted to address the fact that the scanners assessed had already been in use. User QA was also introduced in all radiology departments and has proven to be very effective in identifying faults sooner. As with any new service, the implementation period has had its challenges. **However, once embedded, the importance and effectiveness of ultrasound QA and the benefits of having Medical Physics support were recognised as being essential.**