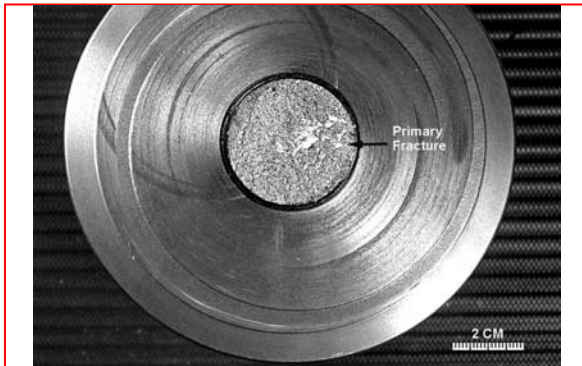


METALLURGICAL LABORATORY

FAILURE ANALYSIS CASE STUDY

Description	Failure in automotive steering system hydraulic cylinder
Problem	Piston failures in reduced section transition radius
Analysis	Superimposed stress concentrations due to transition radius and machining marks resulted in circumferential fatigue crack initiation. Was followed by brittle crack propagation due to notch effects.
Resolution & Recommendations	Modify microstructure from norm. to Q&T and shot peen transition radius to eliminate fatigue crack initiation

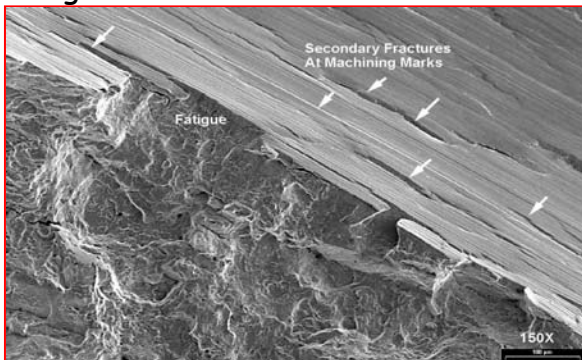
Fracture Location



Steel Microstructure



Fatigue Crack Initiation



Summary of Crack Transition Modes

