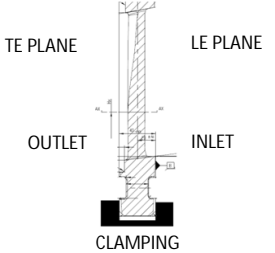
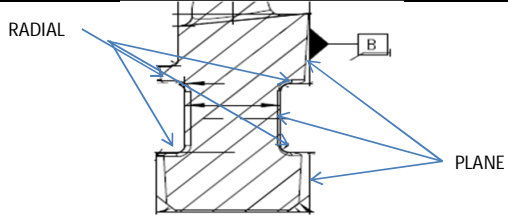
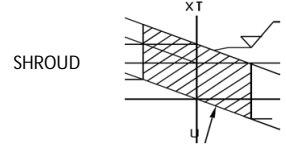


PROCEDURE FOR 3DS_MOVING_BLADE CMM INSPECTION

HY/QC/CMM Inspn/3DS/F/Moving Blades

Dated: 13.12.2013

Prepared by : Ravinder Kumar

ACTIVITY	STEPS	DETAIL	ELEMENT NAME	NOTE
BLADE HOLDING CONDITION	STEP-1	BLADE ROOT RESTS ON FIXTURE- BLADE VERTICAL	OPERATOR	
	STEP-2	TE PLANE PARALLEL TO X AXIS		
		TE END IN FRONT SIDE (TOWARDS OPERATOR)		
PRE-ALIGNMENT	STEP-1	MEASURE ROOT TE PLANE (6 POINTS MIN.)	PLA_TE	PROCEED ONLY IF FLATNESS $\leq 5\mu\text{M}$
	STEP-2	MEASURE ROOT LE PLANE (6 POINTS MIN.)	PLA_LE	
	STEP-3	MEASURE ROOT PRESSURE SIDE PLANE (6 POINTS MIN.)	PLA_PS	PROCEED ONLY IF FLATNESS $\leq 10\mu\text{M}$
	STEP-4	MEASURE ROOT SUCTION SIDE PLANE (6 POINTS MIN.)	PLA_SS	
	STEP-5	MEASURE ROOT BOTTOM PLANE(4 POINTS MIN.)	PLA_BTM	
	STEP-6	CREATE A "MID PLANE_TE_LE" WITH TE & LE PLANE	PLA_MID_LE_TE	
	STEP-7	CREATE A "MID PLANE_PS_SS" WITH PLA_SS & PLA_PS		
	STEP-8	CREATE AN "AXI_MID" WITH "PLA_MID_LE_TE" AND "MID PLANE_PS_SS" BY INTERSECTION	AXI_PS_MID	
	STEP-9	BUILD "ROOT_CSJ:- SPATIAL ALIGNMENT>AXI_MID PLANAR ALIGNMENT>TE PLANE ORIGIN> X-AXI_MID, Y-AXI_MID, Z-BOTTOM PLANE	ROOT_CSJ_PRE	
NOTE:-	CHECK COORDINATE SYSTEM MANUALLY			
ROOT MEASUREMENT	STEP-1	MEASURE ROOT SUCTION SIDE PLANE	PLA_SS	
	STEP-2	MEASURE ROOT TE SIDE ELEMENTS AS PER DRAWING		
	STEP-3	MEASURE ROOT LE SIDE ELEMENTS AS PER DRAWING		
	STEP-4	SHIFT Z ZERO BY BOTTOM RADIUS (R463) TOWARDS ROTOR CENTRE		
	STEP-5	SCAN-RADII ON ROOT eg:- R483 AND R506.3 BOTH TE & LE, AND FIND OUT HIGHEST POINT. (IF POINT SCANNING FACILITY NOT AVAILABLE ON CMM) MULTIPLE POINTS MEASUREMENT FOR R483 & R506.3 AT 1MM INTERVALS IN X, BOTH TE & LE.		
SHROUD MEASUREMENT	STEP-1	SHIFT 'Z' ZERO BACK TO ORIGINAL POINT MEASURE ELEMENTS AS PER DRAWING	MEASUREMENT OF SHROUD-Pressure Side plane, Suction Side Plane, LE Plane & TE PLANE	
MEASUREMENT OF HEIGHT RELATED PARAMETER	STEP-1	MEASURE HEIGHT PARAMETER (TOTAL HEIGHT, S, D DIMENSIONS)		

PROFILE MEASUREMENT

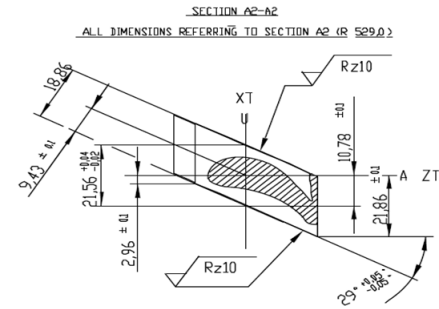
CREATE "Strak" FILE	STEP-1	CREATE A STRAK FILE IN .geo FORMAT, FOR DIFFERENT SECTION MEASUREMENT AND INSERT .geo FILE IN CMM SOFTWARE Or INSERT SEPARATE SUCTION SIDE POINTS AND PRESSURE SIDE POINTS AS PER DRAWING	A(1), A(2), A(3) OR A_PS(1), A_SS(1), A_PS(2), A_SS(2), A_PS(3), A_SS(3)
	STEP-3	DISPLAY AND CHECK THE DATA WHETHER IT IS CORRECT OR NOT	
CREATE A "PROFILE CSY"	STEP-1	SHIFT 66MM "ROOT CSY" FOR PROFILE COORDINATE IN Z DIRECTION	
PROFILE PRE ALIGNMENT	STEP-1	MEASURE POINT ON PROFILE FOR PROFILE PRE-ALIGNMENT	IF REQUIRED
	STEP-2	USE POINTS FOR PROFILE PRE ALIGNMENT	
MEASUREMENT OF PROFILE	STEP-1	MEASURE PROFILE FOR EACH CHECKING SECTION BY USING "ScanOnCurve (known path)" COMMAND FOR BOTH PRESSURE & SUCTION SIDE SEPARATELY.	
	STEP-2	MERGE THE PRESSURE AND SUCTION SIDE PROFILES.	

REPORT-PROTOCOL(SHROUD & ROOT PARAMETER)

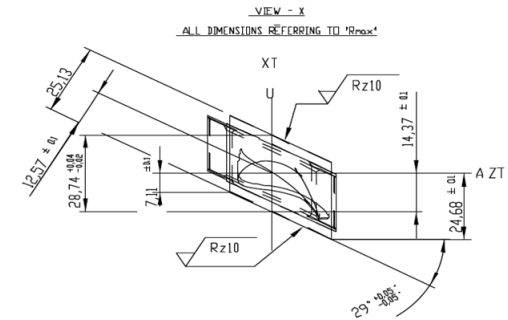
GENERATE PLANE FOR DIFFERENT SECTION & VIEW EVALUATION

FOR SECTION A2-A2, C-C AND VIEW-X EVALUATION

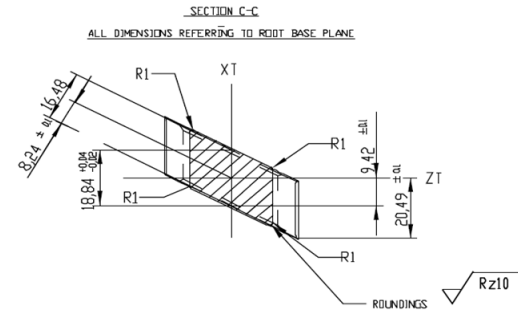
EVALUATION OF SECTION A2-A2:- SHROUD PITCH, SHROUD HALF PITCH, PRESSURE SIDE RHOMBOID ANGLE AND ALL OTHER PARAMETERS SHOWN IN SKETCH (VIEW-A2-A2)



EVALUATION OF VIEW-X:- ROOT PITCH, ROOT HALF PITCH, PRESSURE SIDE RHOMBOID ANGLE AND ALL OTHER PARAMETERS SHOWN IN SKETCH (VIEW-X)

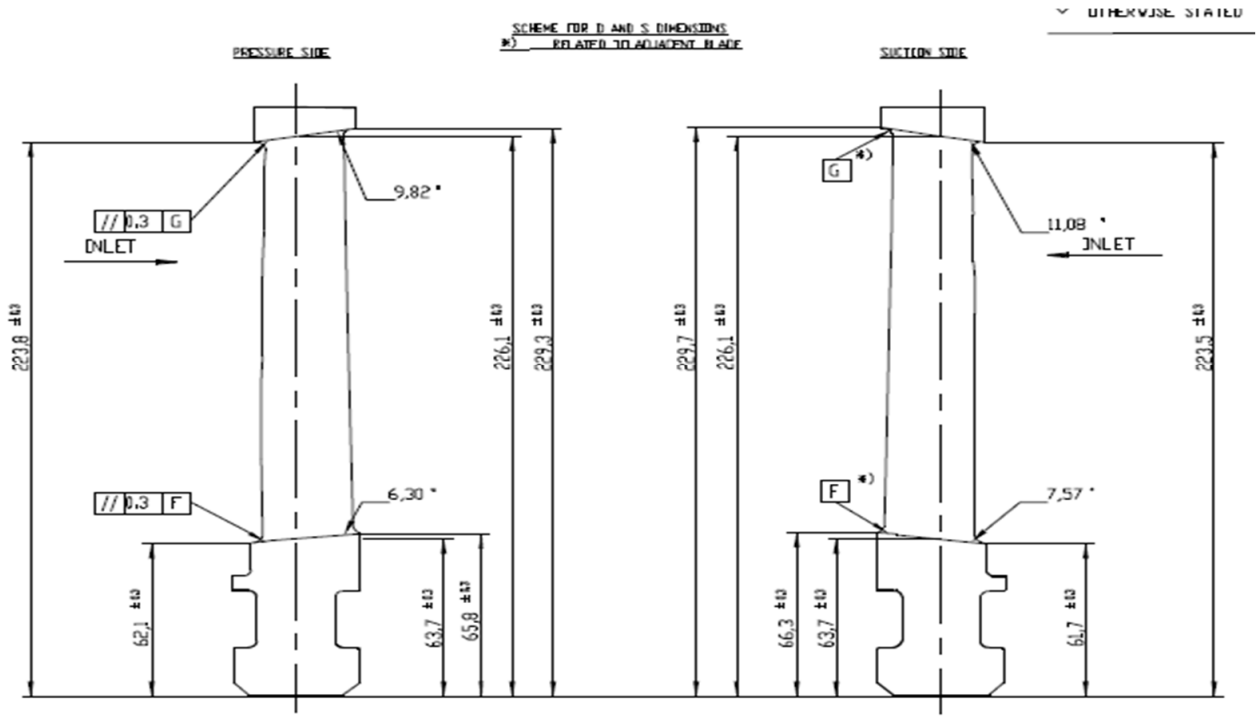


EVALUATION OF SECTION C-C:- SHROUD PITCH, SHROUD HALF PITCH AND ALL OTHER PARAMETERS SHOWN IN SKETCH (VIEW-C-C)



EVALUATION OF TOTAL HEIGHT, S, D DIMENTIONS:-

EVALUATION OF TOTAL HEIGHT, S, D DIMENTIONS ON PRESSURE SIDE & SECTION SIDE HEIGHT



REPORT-PLOT(PROFILE):-

REPORT POINT-WISE "PROFILE" DEVIATION (NOT X, Y DEVIATION) & DRAW PLOT BEFORE BEST FIT ACTUAL/NOMINAL POINTS PROFILE	MAX. DEVIATION AND MIN. DEVIATION WITH LOCATION
REPORT POINT-WISE "PROFILE" DEVIATION AFTER BEST FIT (TOLERANCE ±0.05) & DRAW PLOT AFTER BEST FIT ACTUAL/NOMINAL POINTS PROFILE	MAX. DEVIATION AND MIN. DEVIATION WITH LOCATION
EVALUATION OF PROFILE SECTIONS	MAX. THICKNESS CIRCLE(D), CHORD LENGTH LE-TE, TRAILING EDGE THICKNESS
	OBSERVATION OF PROFILE SHIFT IN X & Y , AND ROTATION ANGLE OF PROFILE FOR EACH CHECKING SECTION