

CALCULATION METHOD

The method used for the calculation of the lateral critical speeds is Myklestad-Prohl Method, which is an extension of the Holzer Method. The analysis consist of a step by step integration of the fourth order differential equation for lateral vibration of a beam. The rotor is represented as a finite number of mass points connected by weightless springs. The bending moments and shear forces at one end of the rotor are expressed as a linear function of deflection and slope of the other end of the rotor. The solution is obtained when the boundary conditions on the rotor are applied to the differential equation.

The response to unbalances can be calculated using the same method. The unbalances are boundary load conditions applied to the differential equation. The response is plotted in terms of amplitude (peak to peak) at the bearings.

DATE:

23 FEB 1982

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PETROCHEMICAL COMPLEX  
ACHELOOS ESTUARY \_ GREECE  
ITEM NR. C 430  
DLS ORDER NR. LC 0261  
CJB PROJECT NR. 4110  
CJB PURCHASE ORDER NR. 4110/A/4/30/01  
CJB DWG NR. 4110/C - 430 /23 *B*

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FINAL DRAWING

SIGNATURE

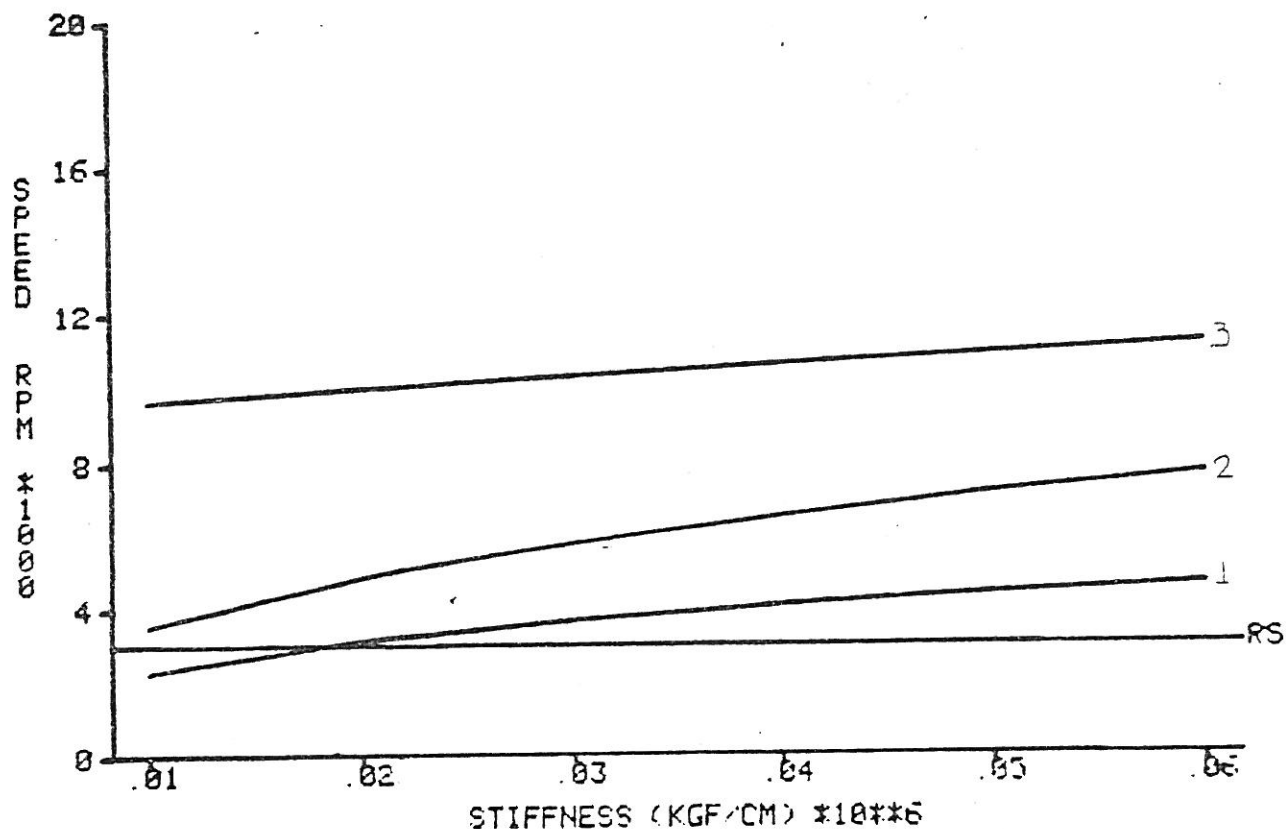
DATE 11-3-82

					TITLE:				DELAVAL STORK		HENGELO (O) HOLLAND	
					LATERAL CRITICAL SPEED REPORT						SHT. No. 1 OF 7	
1	Comments included	2-82	G.L.								No. C02b104 C001	
CHG.	ALTERATIONS	DATE	BY	CHK.	MADE	G.L.		ISSUED	2-82			

# Undamped Critical Speed Map

DELAVAL  
STORK

C011  
CJB HIMIC GREECE LC0261 1PU52

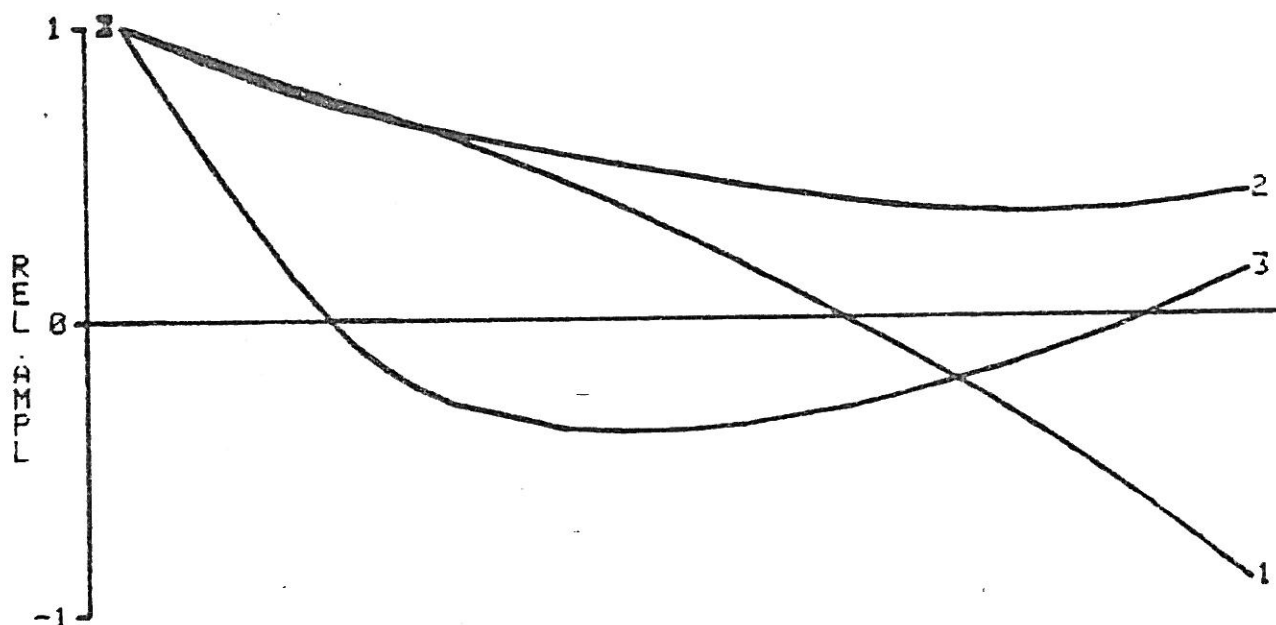
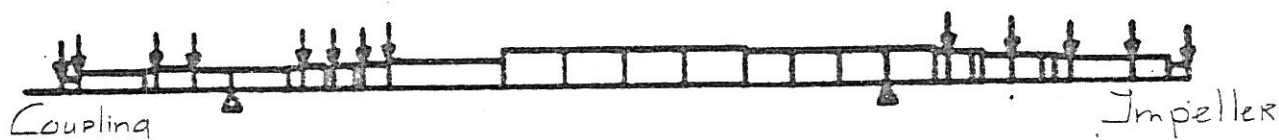


Lateral critical speeds are plotted against support stiffness.  
The effect of damping is neglected.  
The bearing support is assumed to be infinite stiff.

				TITLE: Lateral Critical Speed Report				DELAVAL STORK		HENGELO (O) HOLLAND	
										SHT. No. 2 OF 2	
CHG.	ALTERATIONS	DATE	BY	CHK.	MADE	G.L.	ISSUED	2-82	No. C026104 C001		

# ROTOR CONFIGURATION WITH UNDAMPED CRITICAL SPEED MODE SHAPES

DELAVAL STORK C811  
CJB HIMIC GREECE L08261 1P152



The undamped critical speed mode shapes are plotted based upon oil film stiffness at 2990 R.P.M.

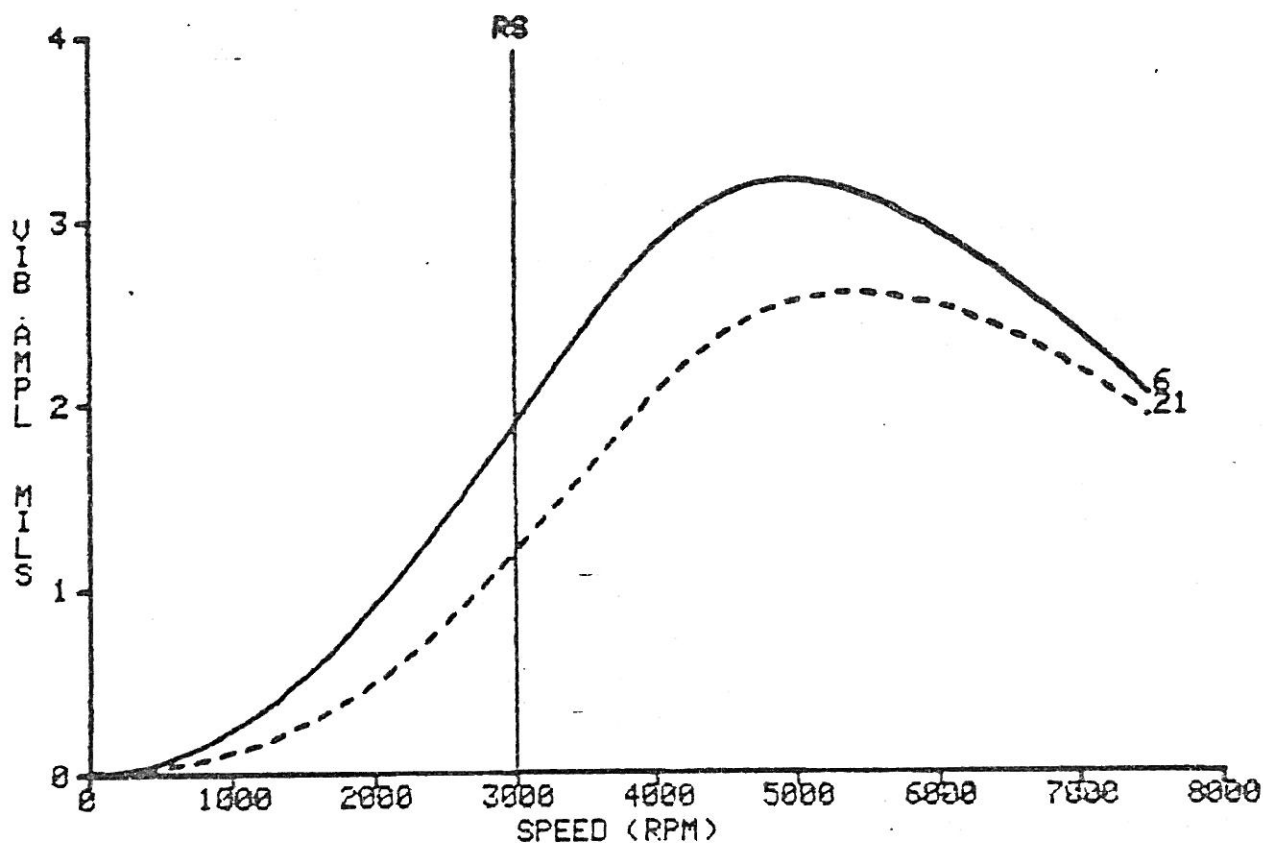
- 1 = first undamped critical speed mode
- 2 = second undamped critical speed mode
- 3 = third undamped critical speed mode

					TITLE:					DELAVAL STORK		HENGELO (O) HOLLAND	
					LATERAL CRITICAL SPEED REPORT							SHT. No. 3 OF 7	
CHG.	ALTERATIONS	DATE	BY	CHK.	MADE	G. L.	ISSUED	2-82	No. C026104C001				

Rotorvibration response due to unbalance at the impeller and the coupling 180 degrees out of phase.

DELAVAL  
STORK

C010 - CASE 1  
CJB HIMIC GREECE LC261 1PU52



— Bearing D.E.

---- Bearing N.D.E.

Bearing stiffness and damping coefficients for the whole speed range as for 2990 R.P.M.

Unbalance at the impeller: 12.500 grmm

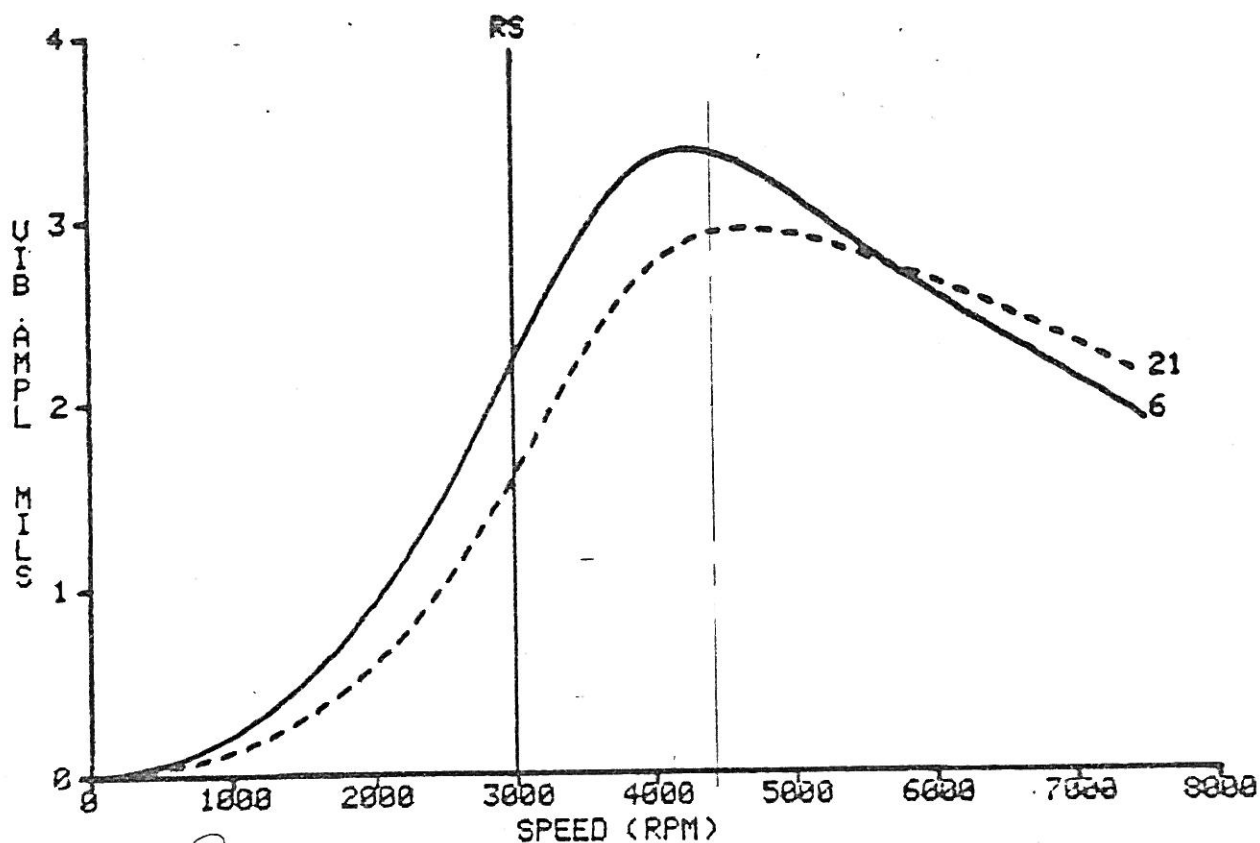
Unbalance at the coupling: 1.200 grmm

					TITLE: Lateral Critical Speed Report					DELAVAL STORK		HENGLO (O) HOLLAND	
												SHT. No. 4 OF 7	
CHG.	ALTERATIONS	DATE	BY	CHK.	MADE	G.L.		ISSUED	2-82	No C0261046001			

Rotovibration response due to unbalance at the impeller  
and the coupling 180 degrees out of phase

DELAVAL  
STORK

C878 - CASE 1  
CJB HIMIC GREECE LC8261 1PV52



—— Bearing DE.  
--- Bearing N.O.E.

Bearing stiffness and damping coefficients for the whole speed range as for 4400 R.P.M.

Unbalance at the impeller : 12.500 grmm

Unbalance at the coupling : 1.200 grmm

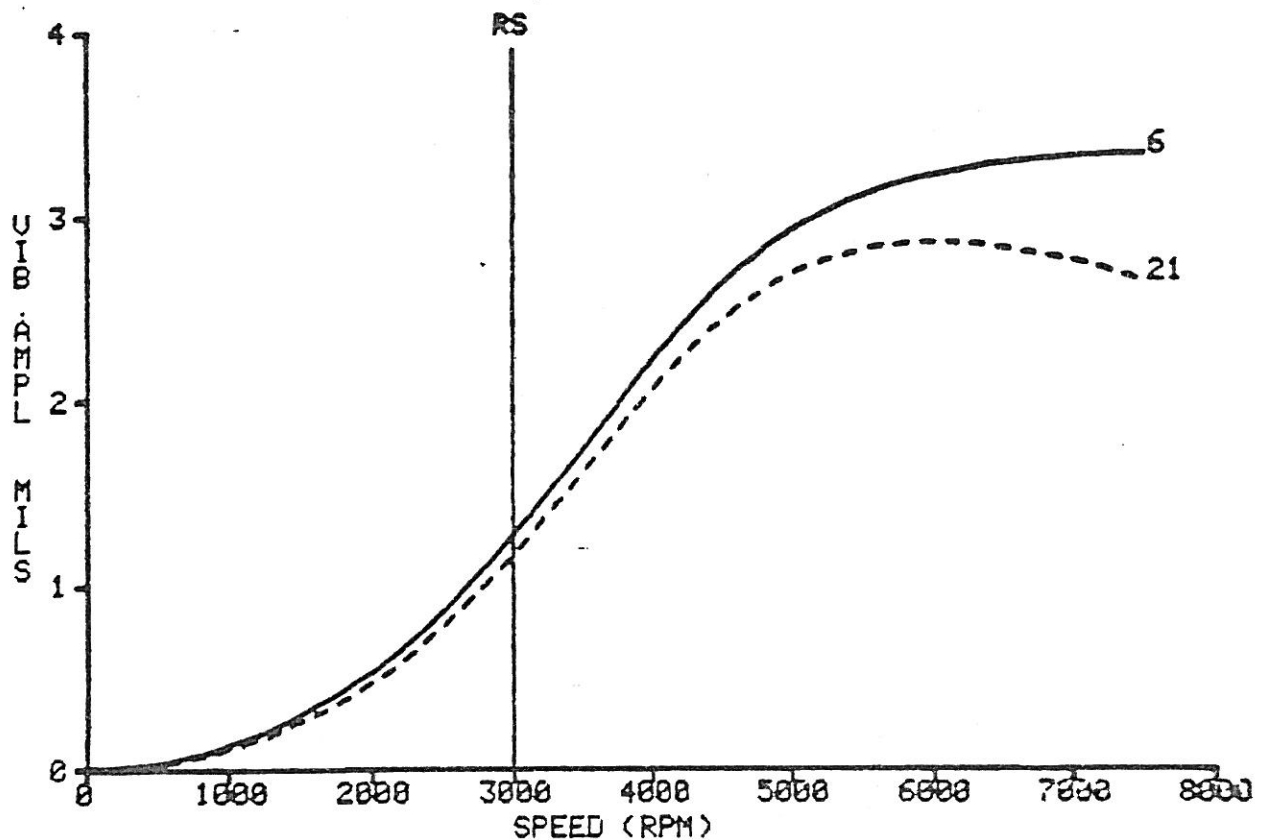
Damped first critical speed: 4400 R.P.M.

				TITLE: Lateral Critical Speed Report				DELAVAL STORK		HENGELO (O) HOLLAND	
										SHT. No. 5 OF 7	
								No. LC826104001			
CHG.	ALTERATIONS	DATE	BY	CHK.	MADE	G.L.	ISSUED	2-82			

Rotorvibration response due to unbalance at the impeller and the coupling in phase.

DELAVAL  
STORK

C010 - CASE 2  
CJB HIMIC GREECE LC0261 1PU52



——— Bearing DE  
- - - - - Bearing N.DE

Bearing stiffness and damping coefficients for the whole speed range as for 2990 R.P.M.

Unbalance at the impeller : 12.500 grmm.

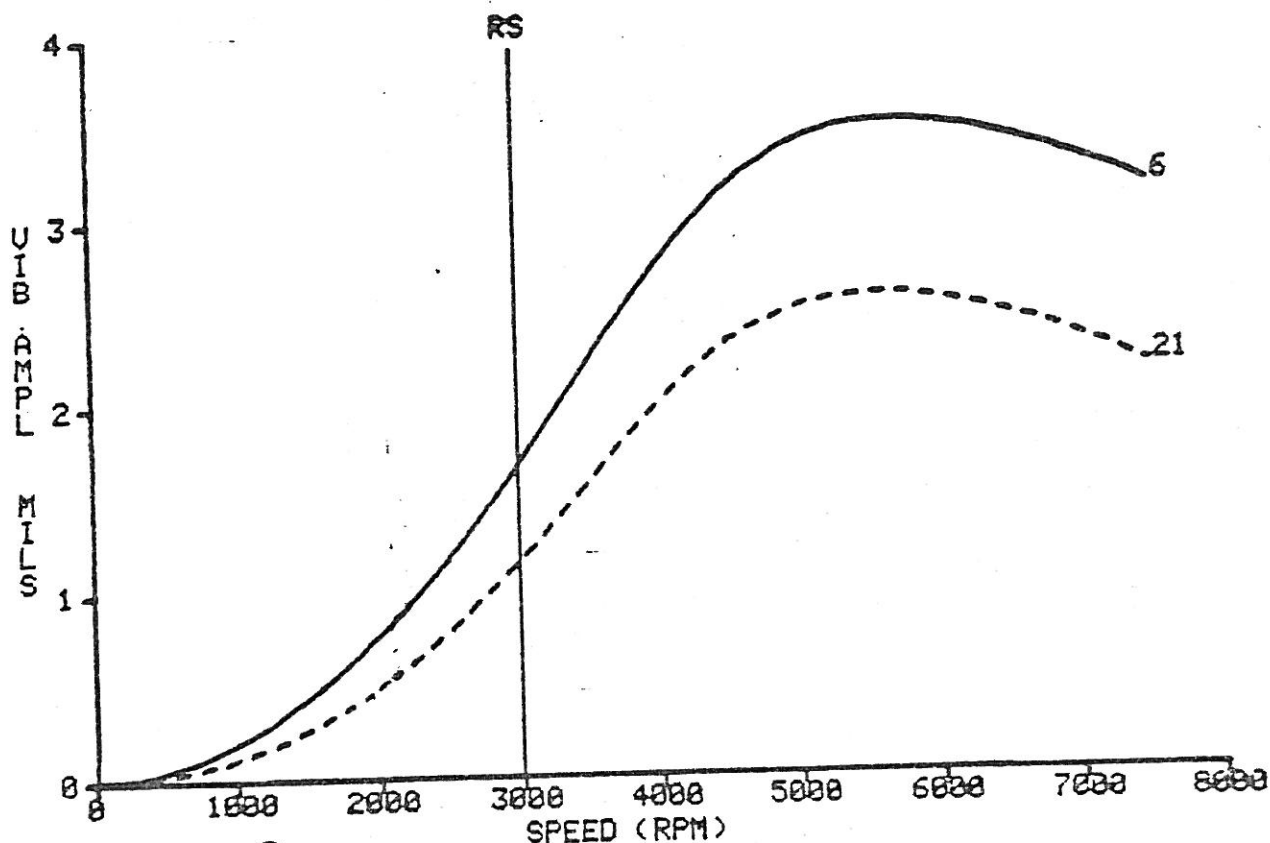
Unbalance at the coupling : 1.200 grmm.

					TITLE:		DELAVAL STORK		HENGLO (O) HOLLAND	
					Lateral Critical Speed Report				SHT. No. 6 OF 7	
									No. C026164C001	
CHG.	ALTERATIONS	DATE	BY	CHK.	MADE	G.L.	ISSUED	2-82		

Rotorvibration response due to unbalance at the impeller and the coupling 90 degrees out of phase

DELAVAL  
STORK

C010 - CASE 1  
CJB HIMIC GREECE LC8261 1PU52



\_\_\_\_\_ Bearing D.E.  
\_\_\_\_\_ Bearing N.D.E.

Bearing stiffness and damping coefficients for the whole speed range as for 2990 R.P.M.

Unbalance at the impeller : 12.500 grmm

Unbalance at the coupling : 1.200 grmm

					TITLE:		DELAVAL STORK		HENGLO (O) HOLLAND	
					Lateral Critical Speed Report				SHT. No. 2 OF 2	
									No. C026104C001	
CHG.	ALTERATIONS	DATE	BY	CHK.	MADE	G.L.	ISSUED	2-82		