THE CRAFT SPLIT BEARING, as any mechanical part, will generate natural frequencies while in operation; also known as fundamental defect frequency. The natural frequencies are generated by the rolling of the rollers as they pass through the load zone. The four distinct natural frequencies generated are the ball spin frequency, fundamental train frequency, and ball pass frequency for the inner and outer race. By predicting the natural frequency of a bearing, design engineers can utilize the information to avoid natural excitation and monitor for the propagation of defects as part of a preventative maintenance program.

The ball spin frequency is the rate at which a point of the Craft bearing's roller comes into contact with either the inner or outer race. The fundamental train frequency is the frequency at which the roller cage entering and exits the load zone. The ball pass frequency is the rate at which a defect in the inner or outer race comes into contact with a roller. Below are the four equations for calculating the fundamental frequencies.

Ball Spin Frequency (Roller)

$$BSF = \left(\frac{D_p}{D_r}\right)\left(\frac{S}{2}\right) \times \left\{1 - \left(\frac{D_r}{D_p}\right)^2 cos\phi\right\}$$

Fundamental Train Frequency (Cage)

$$FTF = \frac{S}{2} \times \left(1 - \frac{D_r}{D_p}cos\phi\right)$$

Ball Pass Frequency Inner (Inner Race)

$$BPFI = N \times \left(\frac{S}{2}\right)\left(1 + \frac{D_r}{D_p}cos\phi\right)$$

Ball Pass Frequency Outer (Outer Race)

$$BPFO = N \times \left(\frac{S}{2}\right)\left(1 - \frac{D_r}{D_p}cos\phi\right)$$

Where,

S = Shaft Speed in RPMs

D_r = Roller Diameter in inches

D_p = Pitch diameter in inches

N = Number of rollers

$\emptyset$ = Contact angle = 0

Size	Series	Pitch Dia.	Roller Dia.	# of Rollers	Frequency Per Shaft Revolution			
					Cage	Roller	Inner Race	Outer Race
108	S1	2.468	0.469	10	0.405	2.537	5.950	4.050
200	S1	3.000	0.500	12	0.417	2.917	7.000	5.000
208	S1	3.560	0.563	12	0.421	3.085	6.948	5.052
	S2	3.875	0.688	12	0.411	2.729	7.065	4.935
300	S1	4.190	0.625	14	0.425	3.277	8.044	5.956
	S2	4.563	0.813	12	0.411	2.719	7.068	4.932
308	S1	4.874	0.688	14	0.429	3.474	7.987	6.013
	S2	5.250	0.875	14	0.417	2.917	8.167	5.833
400	S1	5.563	0.813	14	0.427	3.348	8.023	5.977
	S2	6.000	1.000	14	0.417	2.917	8.167	5.833
408	S1	6.252	0.875	16	0.430	3.503	9.120	6.880
	S2	6.750	1.125	14	0.417	2.917	8.167	5.833
500	S1	6.875	0.938	16	0.432	3.598	9.091	6.909
	S2	7.500	1.250	14	0.417	2.917	8.167	5.833

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Size	Series	Pitch Dia.	Roller Dia.	# of Rollers	Frequency Per Shaft Revolution			
					Cage	Roller	Inner Race	Outer Race
508	S1	7.500	1.000	16	0.433	3.683	9.067	6.933
	S2	8.125	1.375	14	0.415	2.870	8.185	5.815
600	S1	8.000	1.000	18	0.438	3.938	10.125	7.875
	S2	8.750	1.375	16	0.421	3.103	9.257	6.743
	S3	9.500	2.000	12	0.395	2.270	7.263	4.737
608	S1	8.625	1.063	18	0.438	3.995	10.109	7.891
	S2	9.500	1.500	14	0.421	3.088	8.105	5.895
	S3	10.250	1.875	14	0.409	2.642	8.280	5.720
700	S1	9.125	1.063	20	0.442	4.234	11.165	8.835
	S2	10.000	1.500	16	0.425	3.258	9.200	6.800
	S3	10.889	1.938	14	0.411	2.720	8.246	5.754
800	S1	10.126	1.063	22	0.448	4.713	12.154	9.846
	S2	11.250	1.625	16	0.428	3.389	9.156	6.844
	S3	12.110	2.188	14	0.410	2.678	8.264	5.736
900	S1	11.250	1.125	22	0.450	4.950	12.100	9.900
	S2	12.250	1.625	18	0.434	3.703	10.194	7.806
	S3	13.750	2.375	12	0.414	2.808	7.036	4.964
1000	S1	12.376	1.125	26	0.455	5.455	14.182	11.818
	S2	13.505	1.750	18	0.435	3.794	10.166	7.834
	S3	14.500	2.375	14	0.418	2.971	8.147	5.853
1100	S1	13.500	1.250	24	0.454	5.354	13.111	10.889
	S2	14.625	1.875	18	0.436	3.836	10.154	7.846
	S3	15.372	2.375	16	0.423	3.159	9.236	6.764
1200	S1	14.625	1.250	24	0.457	5.807	13.026	10.974
	S2	15.750	1.875	20	0.440	4.140	11.190	8.810
	S3	17.006	2.500	16	0.461	3.328	9.176	6.824
1300	S1	15.620	1.313	26	0.458	5.908	14.092	11.908
	S2	17.020	1.875	20	0.445	4.484	11.102	8.898
	S3	18.741	2.875	14	0.423	3.183	8.074	5.926
1400	S1	16.620	1.313	26	0.461	6.292	14.027	11.973
	S2	18.120	2.063	20	0.443	4.336	11.138	8.862
	S3	19.113	2.750	16	0.428	3.403	9.151	6.849
1500	S1	17.745	1.375	28	0.461	6.414	15.085	12.915
	S2	19.000	2.063	22	0.446	4.552	12.194	9.806
	S3	21.000	3.000	16	0.429	3.429	9.143	6.857
1600	S1	18.745	1.375	30	0.463	6.780	16.100	13.900
	S2	20.125	2.188	22	0.446	4.546	12.196	9.804