

# Case Study Systematic Approach for Elimination of Vibrations in Gapformer Wire-Section to Speed-up the Machine

Dixit Alok, Choudhury Bikramjit, Nair M.B.S.

## ABSTRACT

Emami Paper Mills Limited had commissioned the highest speed 2<sup>nd</sup> hand paper machine in India in the year 2007 which was procured from Inland Empire Paper Company, USA. The machine was designed for 1067 meter per minute speed at pope. Since May 2009, the machine was running at the speed of 1100 meter per minute at pope. During speeding up the machine from 950 meter per minute to 1000 meter per minute the vibration amplitudes in horizontal and vertical planes of both forming roll and rubber expander roll were noticed in wire section. Due to higher vibration amplitudes we were unable to increase the machine speed beyond 1000 meters per minute at wire section.

Experimentation has been done for speeding up the machine beyond 1000 meter per minute speed at wire for finding out the permanent solution.

After modification of rubber expander roll mounting frames the wire speed could be increased to 1060 meter per minute (i.e. speed at pope 1100 meter per minute).

## CASE STUDY:

During speed-up the machine, Severe Vibrations were noticed at both end bearing housings of the forming roll. Vibration readings in mm/sec are given below.

DATE	Drive End Bearing No.22320CCK/C3 W33			MPM at wire.	Non Drive End Bearing No.22320CCK/C3W33		
	H	V	A		H	V	A
7/29/2008	13.73	9.1	3.21	1000	11.3	9.92	4.4
7/29/2008	14.55	8.56	4.07	1000	11.3	6.27	3.51
8/11/2008	14.5	11.04	2.37	1000	8.93	8.17	2.02
8/11/2008	14.89	9.81	2.49	1000	11.14	7.79	2.44
8/11/2008	13.96	9.61	2.41	1000	9	9.11	3.98
8/18/2008	12.92	8.88	3.34	982	10.61	9.48	2.9
8/18/2008	13.05	10.15	3.32	985	8.71	8.49	3.21
8/21/2008	14.43	10.01	2.81	1000	12.89	14.3	2.36
8/22/2008	14.51	11.73	4.99	1000	10.77	9.47	4.68

Temporarily by providing wooden

Emami Paper Mills Ltd., Balgopalpur  
P.O. Rasulpur Dist. Balasore-750020  
(Orissa)

supports in both side bearing housings of forming roll we had increased the wire speed to 1060 meter per minute. The wooden

supports had dampened the vibration amplitudes of horizontal and vertical plane as the support has worked as shock absorber.

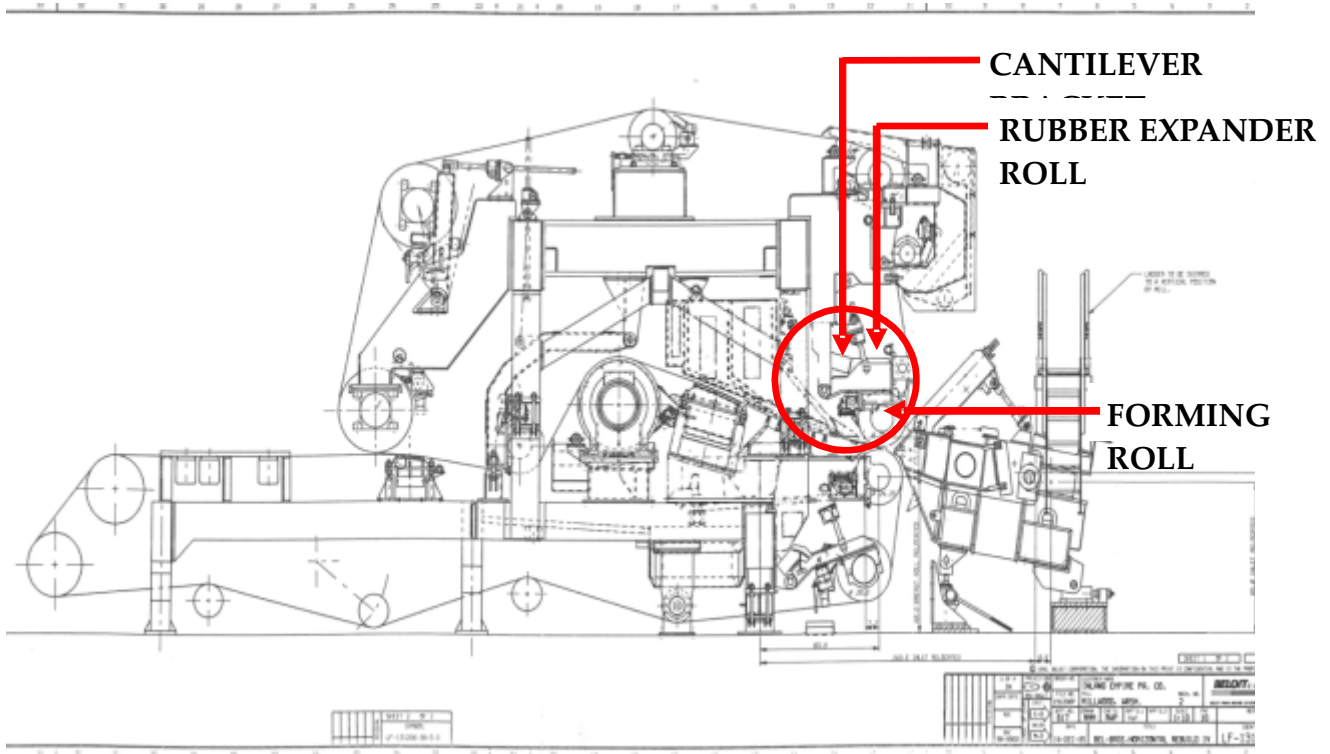


**R&D works carried out for permanent solution.**

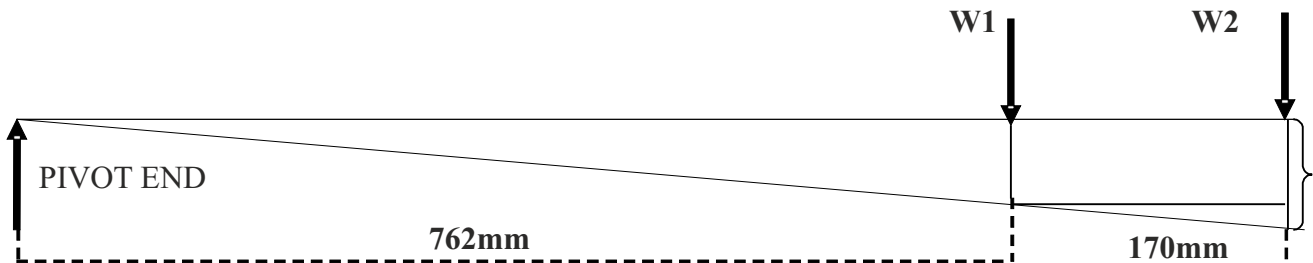
The Beloit had converted the top flight design to Bel-baie IV from Bel-baie III at USA. From the Beloit old records it was found that the vibration in forming

roll was the inherent problem in Beloit design and Beloit had suggested for strengthening the cantilever brackets, which we tried and could not reduce the vibration.

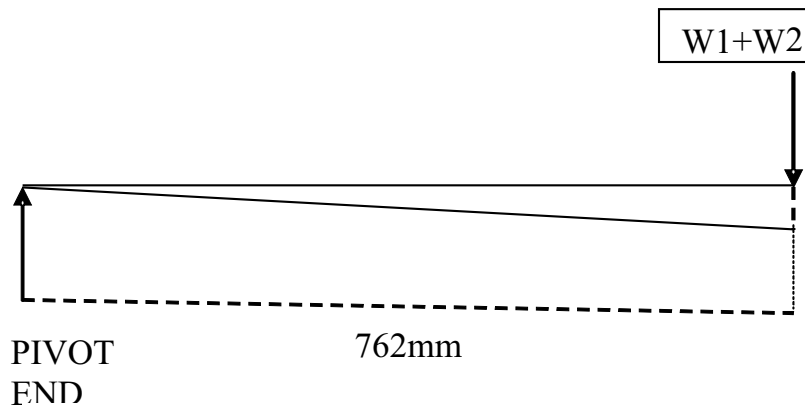
During detailed studies, it was observed that the forming roll is mounted on a cantilever bracket and pivoted at one end. Also rubber expander roll i.e. bow roll is mounted on the cantilever beam just top of the bearing housings of forming roll.



From the design calculations, it is confirmed that the reasons of higher vibrations in forming roll bearing housings is due to higher deflection of cantilever beam at its free end due to dead weight and dynamics of forming and rubber expander roll.



Drive End Bearing No.22320CCK/C3 W33				MPM at Wire	Non Drive End Bearing No.22320CCK/C3W33		
DATE	H	V	A		H	V	A
12.09.2010	8.3	5.2	1.3	1058	3.15	2.09	2.04
14.09.2010	9.3	6.3	1.4	1058	3.38	2.14	1.38
28.09.2010	7.5	4.3	1.8	1058	3.5	2.3	1.53



**Deflection after relocation of rubber expander rolls**

We had relocated the rubber expander roll during last annual shut and mounted the same just on the top of forming roll bearing housings in the same cantilever beam by reducing the effective length i.e. the C/C distance between the pivot pin and rubber expander bearing housings which in turn minimize the deflection at free end of the cantilever bracket. After the modifications vibration amplitudes had reached the permissible limit. Vibration readings in mm/sec after relocation of rubber expander roll are given below.

**Conclusion:**

After doing the above modifications in wire section, we resolved the vibration problem permanently and able to run the machine at 1100 meters per minute.

