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SYSTEM FAILURE ANALYSIS IN HYDRO POWER PLANT

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ABSTRACT

The primary aim of this study is to develop applicable quantitative method for identifying critical components of system in power generating plants.This newspaper reports the analytic thinking of major failure of hydro turbine, generator and transmission scheme which is unable to hand over the power.Thus, the use of fault tree analysis as one method of studying the reliability of these complex organizations.

KEYWORDS: *Fault tree analysis, Hydro Power Plant, Transmission system.*

INTRODUCTION

Hydro power plant has traditionally been thought to consist of three sections, turbine, generator and transmission scheme.Info about the cracks and failure of turbine, generator and transmission system is generally kept secret by the plant management and by the machine maker; thus not all the cases have been reported and dissected in the literature, particularly in the recent years.A catastrophic failure in hydro power plant is rare, mainly due to the fact that the main problem during surgical procedure are related to citations, erosion and material defect.The transmitting scheme is always subjected to failure in its interconnected parts, for example, lighting, storms, human errors or aging equipments.Every failure has a major event on the economy due to loss of productive hours, man our losses.Therefore, for losses in production, corrective and preventive action should be considered.In parliamentary procedure of this, hazard identification can play an important part.In parliamentary law to reduce the probability, frequency and duration of failure effects and cut its effect, it is necessary to perform financial investments in a direction to increase the system reliability.Fault tree analysis have been successfully used in many forms of technological operations to better operational reliability and safety.

MATERIAL AND METHOD

Fault tree analysis is a systematic deductive procedure used to identify the basic causes of a fault event. The method is deductive because it originates from a single error at the crest of a flow chart and expands out and downward to identify the many contributing causes to that single top fault.Therefore the method moves from one outcome to many issues.Many fault conditions would be placed and then these conditions would be assessed to see how they might link to generate an undesired effect.Fault trees are the model which is produced with the aid of logic gates and the consequence and cause relationship.Fault tree analysis has a cut sets which help to the actual case of bankruptcy, we apply this technique on the turbine and generator of power generating plant and therefore determine the chance of bankruptcy.Feta is often practiced to generate: 1) Qualitative description of possible problems. 2) Quantitative estimates of failure frequencies. 3) Suggested actions to reduce risk. 4) Quantitative evaluations of recommendation effectiveness.

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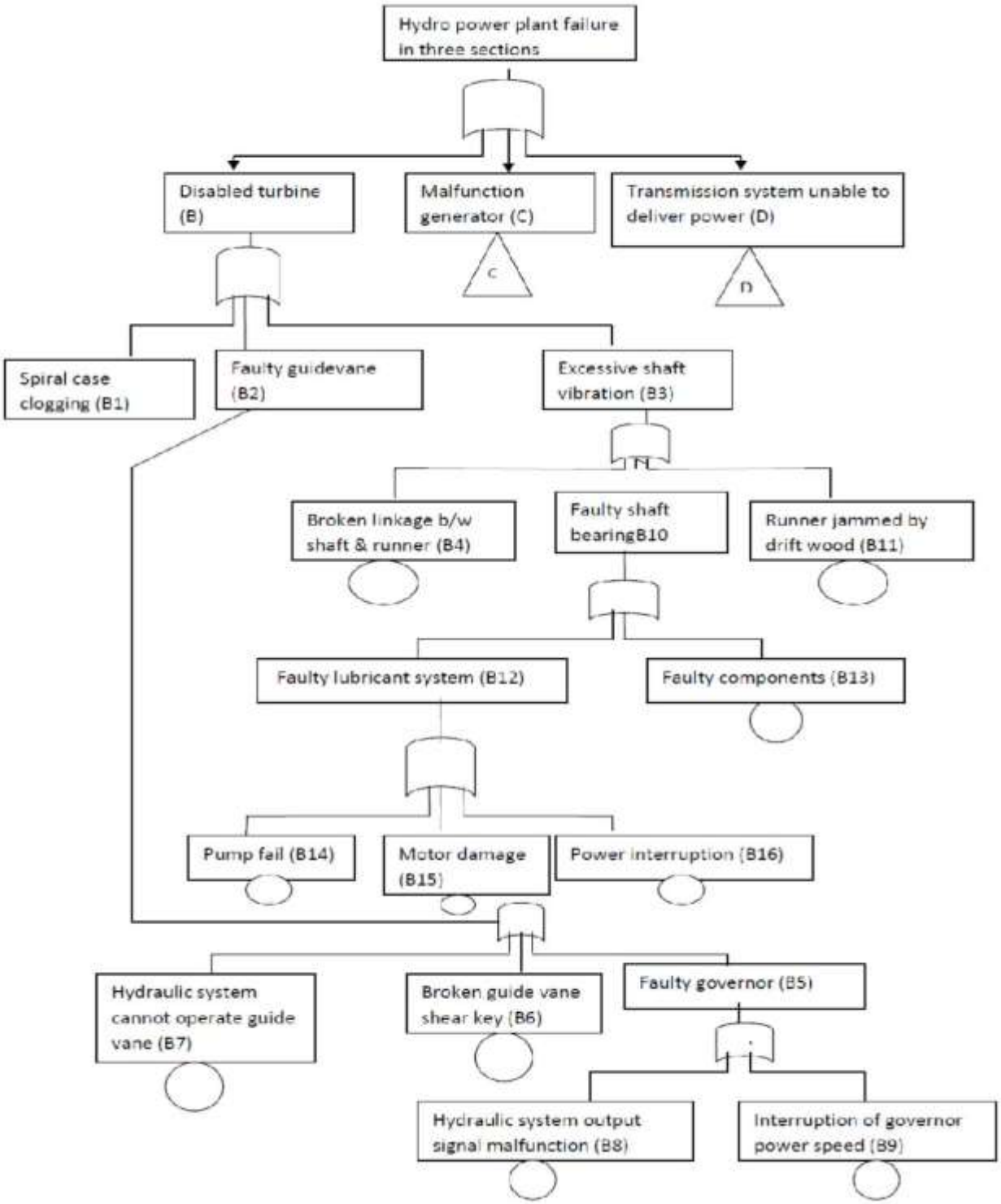

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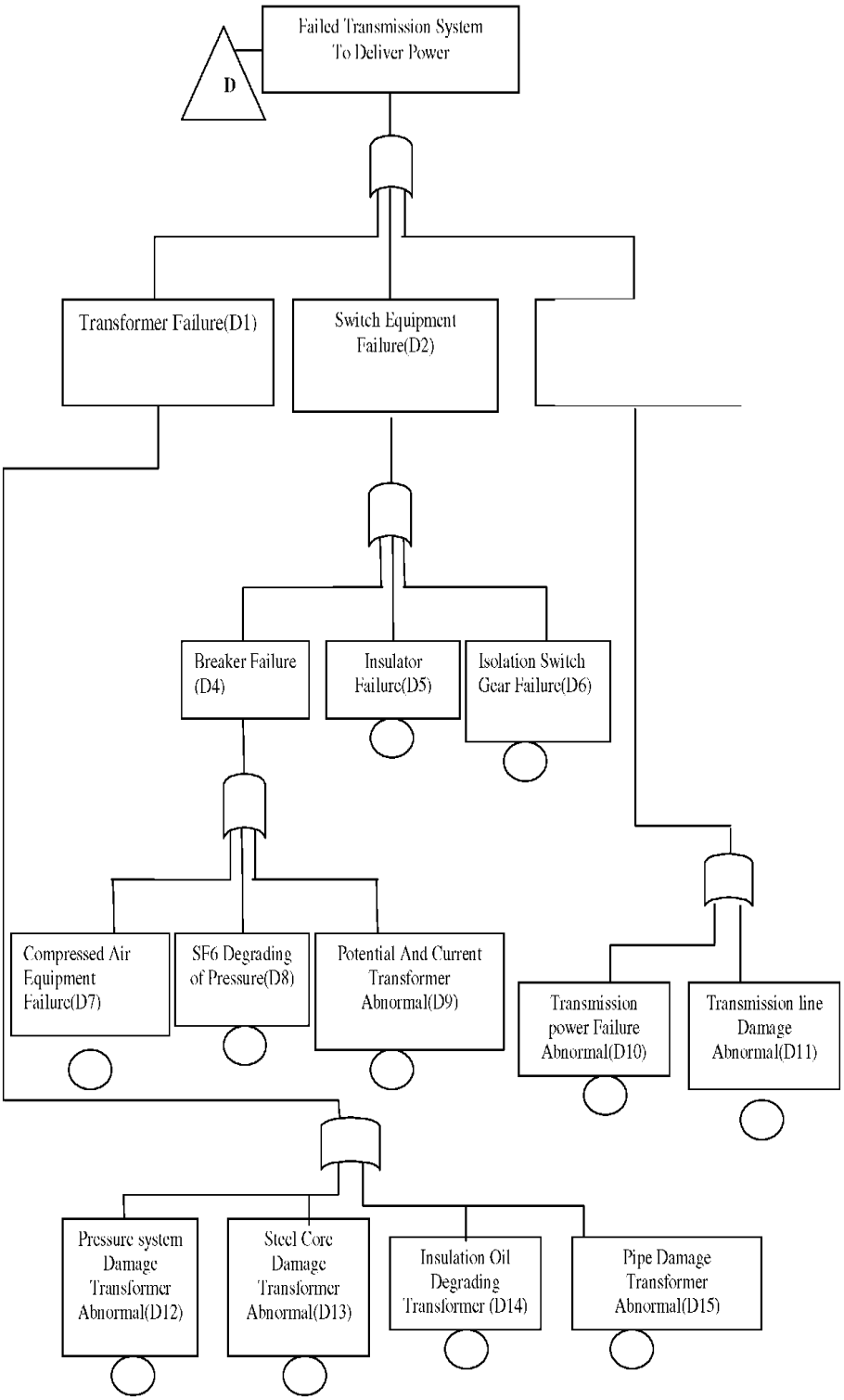

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Cutlery sets are the key product, developed by FTA. Here we have taken, the cuts sets of the faulty guide vane (B2). The cut sets of the faulty guide vane are B6, B7, B8 and B9. Let, Failure Probability based on the failure time per (100) hrs.
Therefore, As per OR gate expansion formula

Cut Sets B5 = B8 + B9

B2 = B5 + B6 + B7 = B8 + B9 + B6 + B7

Probability based on the failure time per (100) hrs....

As per OR gate expansion formula P(B5) = P(B8) + P(B9)-[P(B8,B9)]

$= 3 \times 10^{-6} + 2 \times 10^{-6} - (3 \times 10^{-6} \times 2 \times 10^{-6})$

$= 4.99 \times 10^{-6}$

P(B2) = P(B5) + P(B6) + P(B7)[P(B5,B6) + P(B6, B7) + P(B7, B5)] + P(B5,B6,B7)

Transmission Equipment Failure(D3)

$= 4.99 \times 10^{-6} + 2 \times 10^{-7} + 2 \times 10^{-6}[4.99 \times 10^{-6} \times 2 \times 10^{-7} + 2 \times 10^{-7} \times 2 \times 10^{-6} + 2 \times 10^{-6} \times 4.99 \times 10^{-6}] + [4.99 \times 10^{-6} \times 2 \times 10^{-7} \times 2 \times 10^{-6}] = 7.189 \times 10^{-6}$

Table showing the failure probability of various cuts sets during 100 hrs working

S.No	TEXT/NAME	FAILURE PROBABILITY	EXTENSIN NAME
1.	Faulty guidevane Faulty governor	7.189×10^{-6} 4.99×10^{-6}	B2
2.	Hydraulic system output signal	3×10^{-6}	B5
3.	malfunction Interruption of	2×10^{-6}	B8
	governor power		B9
4.	speed		
	Broken guide	2×10^{-7}	
	vane shear key		B6
5.	Hydraulic system	2×10^{-6}	
	cannot operate		B7
6.	guide vane		

CONCLUSION

Fault tree analysis is a useful technique to determine the root causes of a fault event such as failure of critical parts of the organization i.e.Turbine, generation and transmission scheme which is unable to hand over the power.The technique FTA has great importance for the evaluation of potential failures in the organization. They proportionate objective analysis to system project. The quantitative analysis made possible the determination of the most influential root causes of this issue.Methodology (FTA) concluded that the court sets we have found along with their probabilities can play a major role in the failure of the scheme i.e.Turbine, generation and transmission arrangement.The loser of any function of the system can cause due to the various reasons we have taken into account.

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