

SPECIAL ISSUE OF  
QUALITY AND RELIABILITY ENGINEERING INTERNATIONAL

**RELIABILITY IMPROVEMENT OF DIESEL ENGINE USING FMETA  
APPROACH**

G. Arcidiacono<sup>a</sup>, G.Campatelli<sup>b</sup>

*\*Dipartimento Meccanica e Tecnologie Industriali  
Università degli Studi di Firenze  
Via di S.Marta, 3, 50139, Firenze, ITALY  
Tel. +39 055 4796291  
Fax +39 055 4796394*

*<sup>a</sup>E-mail: [gabriele.arcidiacono@unifi.it](mailto:gabriele.arcidiacono@unifi.it)*

*<sup>b</sup>E-mail: [gianni.campatelli@unifi.it](mailto:gianni.campatelli@unifi.it)*

SUMMARY

This paper provides a way to deal with issues related to Design for Reliability using Axiomatic Design (AD). A theoretical approach is studied, starting from the traditional theory of AD, in order to help designers to optimize the product's reliability using a structured approach.

Aim of this work is to introduce a new method able to assess the product reliability using the support of the AD methodology combined with other methods: e.g. FMEA and FTA. The approach developed is called by the authors Failure Mode and Effect Tree Analysis (FMETA). The FMETA allows the designer to find the most critical characteristic of the product on a reliability point of view and to provide the designer with a set of possible changes.

The core of this work is the development of a Reliability Tree, used to evaluate both the RPN for the component of the product and to find the reliability relation useful for the following optimization. The Reliability Tree is born from the combined use of AD, FMEA and FTA.

This method has been validated by an application to an automotive heavy-duty diesel engine.

KEYWORDS: Axiomatic Design, Reliability Matrix, FMEA, FTA.