



# **7. International Quality Conference**



## **CONFERENCE MANUAL**

---

*May 24<sup>rd</sup> 2013, Kragujevac*  
*Faculty of Engineering, University of Kragujevac*

## 7. International Quality Conference Conference manual

**ISBN: 978 - 86 - 86663 - 94 - 8**

**Editors:** *Dr Slavko Arsovski*, full professor  
Faculty of Engineering, Kragujevac  
*Dr Miodrag Lazic*, full professor  
Faculty of Engineering, Kragujevac  
*Dr Miladin Stefanovic*, associate professor  
Faculty of Engineering, Kragujevac

**Technical Editor:** *Snezana Nestic*  
Faculty of Engineering, Kragujevac

**Publisher:** **FACULTY OF ENGINEERING**  
34000 KRAGUJEVAC  
Sestre Janjic 6

**CENTER FOR QUALITY**  
34000 KRAGUJEVAC  
Sestre Janjic 6

**For publishers:** *Prof. dr Miroslav Babic*  
*Prof. dr Slavko Arsovski*

**No. of copies:** 200

**Printing:** Faculty of Engineering, Kragujevac

*Copyright © Faculty of Engineering, University of Kragujevac, 2013.*

*Copyright © Center for Quality, Kragujevac, 2013.*

---

---

Publication of Conference manual and organization of  
7. International Quality Conference is supported by:  
**Department of Education, Science and Technological Development of Republic of  
Serbia**

Izdavanje Zbornika radova, organizovanje i održavanje  
7. International Quality Conference podržalo je:  
**Ministarstvo prosvete, nauku i tehnološkog razvoja Republike Srbije**

CIP - Каталогизација у публикацији  
Народна библиотека Србије, Београд

005.6(082)

INTERNATIONAL Quality Conference (7 ; 2013 ;  
Kragujevac)

Conference Manual / 7. International  
Quality Conference, May 24rd 2013, Kragujevac  
; [organized by] Faculty of Engineering,  
University of Kragujevac ; [editors Slavko  
Arsovski, Miodrag Lazic, Miladin Stefanovic].  
- Kragujevac : Faculty of Engineering, 2013  
(Kragujevac : Mašinac). - XII, 706 str. :  
ilustr. ; 24 cm

Tekst štampan dvostubacno. - Tiraž 100. -  
Str. IV: [Preface] / Slavko Arsovski. -  
Napomene i bibliografske reference uz tekst.  
- Bibliografija uz svaki rad.

ISBN 978-86-86663-94-8

1. Faculty of Engineering (Kragujevac)

a) Менаџмент тоталним квалитетом - Зборници  
COBISS.SR-ID 198330636

Milos Matejic<sup>1)</sup>  
Mirko Blagojevic<sup>1)</sup>  
Zorica Djordevic<sup>1)</sup>  
Nenad Marjanovic<sup>1)</sup>  
Nenad Petrovic<sup>1)</sup>

1) Faculty of Mechanical  
Engineering, University of  
Kragujevac, Serbia  
{mmatejic,mirkob,  
zoricadj, nesam,  
npetrovic}@kg.ac.rs

## COMPARATIVE ANALYSIS OF DIFERENT TYPE REDUCERS FOR WINCH DRUM DRIVING UNIT

**Abstract:** Thanks to modern technological advances, today is developed so many of different types of mechanical transmissions. They are differences in performance, dimensions, mass, efficiency ratio, and of course price. In the framework of this paper is to set the output parameters (puling force, rotations per minute) the concept of the ship's winch drum are developed and elaborated. Performed by calculation of its operating parameters (power and rotations per minute of electric motors, power transmission and gear ratio) its three-dimensional model has been made. Then is analyzed the possibility of implementing different types of reducers due to the fact that there is a large difference in the torque, rpm and efficiency ratio in relation to the mass and overall dimensions. The paper also presents the results of mutual comparisons given reducers as well as guidelines for the selection of optimal solutions.

**Keywords:** winch, drive unit, drum, reducer, comparative analysis

### 1. INTRODUCTION

Thanks to modern technological advances, many different types of mechanical transmissions are developed today. Nearly all mechanical systems contain at least one or more types of mechanical transmission. Among the mechanical powered, transmission gearboxes are the most widely used. During the development of the industry, many types of reducers have appeared: coaxial reducers, reducers with conical gears, worm reducers, planetary reducers, cycloid drives, harmonic drives, etc.

Conventional reducers include gearboxes with parallel shaft axes and with cylindrical gears, which are single stage or multistage reducers, [1, 2]. Reducers with conical gears are used when the input and output shaft axis need to be intersecting [3]. Quite often, reducers, which are a

combination of cylindrical and bevel gear pairs are used. Cylindrical and conical gear reducers are characterized by a very high level of efficiency, while their overall dimensions and mass are greater than other types of reducers.

Worm reducers are usually made in a single stage or in two stages. They are used in situations where the input and output axis need to bypass [4]. Worm gear reducers are characterized by smaller overall dimensions and mass compared to conventional gear reducers, and have a lower level of efficiency. The greatest advantage of worm gears compared to their conventional counterparts is a much higher transmission ratio. In practice, different types of gear pairs, cylindrical, conical, and worm, are combined in one reducer housing. And this type of reducer was and still is the subject of many studies.

Planetary gearboxes are classified















