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Parametric investigation and optimization of revolving tools-based magnetorheological finishing process for external cylindrical surface of printing machine roller made of copper

[Gagandeep Singh](#) , [Arvind Jayant](#), and [Manpreet Singh](#) [View all authors and affiliations](#)

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Abstract

The cylindrical copper rollers are an essential part of the printing process. The copper roller needs to be finely finished to ensure the even distribution of the colors. Fine and precise polishing of cylindrical copper rollers is challenging using conventional finishing procedures because of their ductility and low hardness. Therefore, the magnetorheological finishing process based on three revolving flat-tip tools has been used to meet this precise requirement. The optimized parameters were found as current 3.5A for the electromagnet, rotating speed of the workpiece 510 rpm, revolving speed of the tools 35 rpm, working gap 0.7 mm and feed rate 150 mm/min for maximum percentage reduction in the surface roughness of copper roller. After 4 h of finishing with the optimal parametric settings, the Ra, Rq, and Rz values were reduced to 0.08, 0.1, and 0.67 μm from the initial values of 0.375, 0.527, and 1.96 μm , respectively, across the copper



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Magnetorheological fine finishing of steering rack bar for improving its functional operation

[Manpreet Singh](#) and [Sunil Kumar Paswan](#) [View all authors and affiliations](#)

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Abstract

Fine-finished external cylindrical surfaces in automotive manufacturing parts are of great importance for improving their performance. A finely finished external surface of steering rack bar leads to a decrease in its response time. So, in this work, the rotating core-based magnetorheological (MR) finishing process has been performed on the external surface of steering rack bar to improve its performance. In this work, the process parameters have been optimized to fine-finish the current workpiece with minimized efforts. The optimum conditions of process parameters are depicted using full factorial central composite design (CCD) under response surface methodology technique. The maximum contribution to the response, i.e. % change in surface roughness value is found from current (15.28%) and rotational tool speed (8.66%). Using the optimum finishing parameters, the average surface roughness value of the steering rack bar external surface achieved was 30 nm from 550 nm with finishing time of 90 min. Also, the fine finishing of steering rack bar's external surface was confirmed by a comparative study of scanning electron microscopic and mirror images of initial and final finished surfaces conducted in this study. Thus, this study advocated that the current process can be beneficial for fine finishing of industrial components such as rocker arm shafts, vacuum pistons, and cylindrical punches.

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Magnetorheological finishing of aluminium cylindrical roller for enhanced performance of printing operation

[Manpreet Singh](#)  and [Sunil Kumar Paswan](#) [View all authors and affiliations](#)

[Volume 236, Issue 6](#) | <https://doi.org/10.1177/09544089221093010>


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Abstract


Aluminium is the most versatile engineering material for various industries, such as transport, machinery, metallurgy and printing. The aluminium cylindrical roller plays a significant role in the printing machine. In order to evenly distribute the pressure and for accurate tolerances roller needs to be perfect and uniformly finished. Owing to their ductility and lesser hardness, it is difficult to achieve uniform and fine finishing by conventional finishing methods. The rotary magnetorheological (MR) method is established to satisfy this requirement. The MR polishing fluid composition is initially analysed in order to obtain a fine finish. The central composite design was employed to optimize the finishing parameters. The batch gradient descent algorithm is used to validate the RSM optimization of process parameters. Batch gradient descent gives the mathematical model which validates the RSM mathematical model. The scan electron microscopy, reflectivity test and surface roughness profile check were carried out to track the surface texture and the cylindrical aluminium roller's ruggedness. The standard deviation test is performed to measure the uniformity of the finished surface and demonstrate that the uniformity of the finished surface which is increased. Geometric measurements are tested by the way of the surface waviness measurement. The results of earlier process parameters and with addition of reciprocation of work-part is compared and experimentation performed on 120 mm long and 25 mm diameter of the aluminium cylindrical roller with 30 mm length for each trial.

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Original Paper | [Published: 03 January 2021](#)

CNTFET Based 4-Trit Hybrid Ternary Adder-Subtractor for low Power & High-Speed Applications

[Suman Rani](#) & [Balwinder Singh](#)

[Silicon](#) **14**, 689–702 (2022) | [Cite this article](#)

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Abstract

To go through the phenomenon at nanoscale regimes, circuits using the CNTFETbased on Ternary Logic have been explored due to their constantly increasing application in high-speed low power designs. In this paper, 4-Trit Ternary Adder-Subtractor (TAS) using Complementary metal-oxide-semiconductor (CMOS) and Carbon Nanotube Field-Effect Transistor (CNFET) is proposed, which demonstrates the ternary addition and subtraction with a single circuit. The design style is based on conventional static CMOS implementation. The Fundamental ternary logic units are connected to achieve the required design. Therefore, prominence is given to the optimization of these fundamental units. The implementation and simulation are analyzed and validated using Hailev Simulation Program with Integrated

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Regular Paper | Published: 15 February 2021

CNTFET Based Ternary 1-Trit & 2-Trit Comparators for Low Power High-Performance Applications

Suman Rani, Balwinder Singh & Rekha Devi

Transactions on Electrical and Electronic Materials **22**, 734–749 (2021) | [Cite this article](#)

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Abstract

1-Trit and 2-Trit Ternary comparator circuits using Complementary Metal–Oxide–Semiconductor (CMOS) as well as Carbon Nanotube Field-Effect Transistor (CNTFET) is proposed and investigated for Low Power High-performance applications. The design and simulation are investigated and authenticated using Hailey Simulation Program with Integrated Circuit (HSPICE) with Predictive technology model (PTM) low power 32 nm metal gate/High-K/Strained-Si Model for CMOS and 32 nm Stanford Model for CNTFET. The CNTFET based design is compared with the CMOS design in terms of significant design aspects, specifically delay, Average Power consumption and Power delay product (PDP). A comparison is performed among CMOS and CNTFET based ternary comparator circuits which reveals that CNTFETs can lead to more efficient ternary circuits. In terms of delay and power

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Published: 02 August 2019

Construction of girth-8 $(3,L)$ -QC-LDPC codes of smallest CPM size using column multipliers

[Jasvinder Singh](#), [Manish Gupta](#)  & [Jaskarn Singh Bhullar](#)

[Designs, Codes and Cryptography](#) **88**, 41–49 (2020) | [Cite this article](#)

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Abstract

In this paper, a new method for the construction of the exponent matrix of quasi-cyclic low-density parity-check (QC-LDPC) codes is proposed. The entries of the exponent matrix are based on the column multipliers. To find the column multipliers, a parameter S_{α} is defined which gives the value of column multiplier of the α th column. The proposed method reduced the complexity related to the formation of the exponent matrix and results in $(3,L)$ -QC-LDPC codes with girth at least eight, for $L > 3$. Also, a lower bound on the size of the circulant permutation matrix (CPM) for a QC-LDPC code is derived, and the codes constructed by this method are optimal to the given bound. Further, most of the codes constructed using this

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Review of Application Industrial Robots

¹H S Gill and ²Arshdeep Singh Kalsi

¹Professor, Department of Mechatronics Engineering, Chandigarh University, Mohali, Punjab, India.

²Asst. Prof., Department of Mechanical Engineering, Baba Farid College of Engineering & Technology, Bathinda, India.

Abstract

Robotics is currently within an infantile period of invention which crosses engineering restrictions which are standard. The data their app demand knowledge of mechanical engineering, technology and technology and mathematics and the matter of robots. New technology areas, including technology has been recognized to handle the intricacy of factory automation and the robotics. This paper will reveal quite a few of those arms on the ground and will exhibit the parts of the arm and also the mechanisms. A number of the sections will reveal the classification of robotics generally to gain understanding of robotics, like classes, method and program location of control. Design issues go to be shown as the total amount of connectivity level, redundancy along with mobility. The traits of this hybrid arm's structure and also there is a demand while inside the use of buildings are reviewed. Vital phrases Serial manipulators, Hybrid arm manipulators

1 Introduction

Discovered plenty of experiments completed inside age and this afternoon because of hastened requirements using the arm on arm. The arm includes manv edees which will possibly be far much greater when comnared with



Published: 27 November 2019

On the search of smallest QC-LDPC code with girth six and eight

Jasvinder Singh, Manish Gupta  & Jaskarn Singh Bhullar

Cryptography and Communications 12, 711–723 (2020) | [Cite this article](#)

192 Accesses | [Metrics](#)

Abstract

In this paper, a new and simple method for the construction of Girth-6 (J,L) Quasi-Cyclic Low-Density Parity-Check (QC-LDPC) codes is proposed. The method is further extended to the search of Girth-8 QC-LDPC codes with base matrices of order $3 \times L$ and $4 \times L$. The construction is based on three different forms of exponent matrices and the parameters α , p , and q which satisfy the necessary algebraic conditions for a QC-LDPC code having girth 6 and 8. The proposed (J,L) QC-LDPC codes with girth at least six have optimal circulant permutation matrix (CPM) size for the cases where $q = \alpha + 1$. Moreover, most of the girth-8 QC-LDPC codes searched by the proposed method have smaller CPM size than the existing codes of the same girth. In several cases, the method gives more than one exponent matrices for a code, as most of the existing methods cannot do so. Besides this, the proposed method not only search the QC-LDPC codes with smaller CPM size but also takes much less time than the existing search based methods to search code.

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Published: 25 February 2019

Parameterized Comparison of Nanotransistors Based on CNT and GNR Materials: Effect of Variation in Gate Oxide Thickness and Dielectric Constant

Anjana Kumari, Suman Rani & Balwinder Singh

Journal of Electronic Materials **48**, 3078–3085 (2019) | [Cite this article](#)

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Abstract

Silicon based technology encounters scaling parameters that prohibit the advancement of transistor technology. Graphene nanoribbons (GNR) and carbon nanotubes (CNT) are often considered the predominating devices to replace silicon technology. Carbon nanotube field effect transistors (CNTFETs) are considered the most promising devices because of their most interesting properties such as high current carrying ability (~ 1010 A/cm²), excellent carrier mobility, scalability, high reliability for elevated temperature operation, and negligible leakage current. In this paper, a comparative analysis of CNTFET and graphene nanoribbon field effect transistors (GNRFET) is presented. The results of simulations are presented, and comparisons of devices are done based on different parameters listed as I_{ON}/I_{OFF} current ratio, transconductance, and inverse subthreshold slope using NanoTCAD VEDS. After

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Ternary Logic Design Approach - From CMOS to CNTFET

Suman Rani, Gagandeep Kaur, Balwinder Singh Lakha

Abstract

The goal of this review is to offer a broad study on the ternary logic designs based on CMOS (complementary metal-oxide-semiconductor) and CNTFET (carbon nanotube field effect transistor) suitable for energy efficient and high-performance VLSI design. Performance investigation of the ternary logic-based designs will be the primary emphasis as the ternary logic is a good substitute for the conventional binary logic among all the multiple-valued logics because it permits simple and power efficient digital design owing to the lessen chip area and circuit overhead due to interconnects. The usefulness of this paper lies in the field of academic and research related to low power and high-speed VLSI design, and nano-scale devices. A brief summary of ternary logic designs based on CMOS and CNTFET is presented. This study enables the reader to clear basic concepts about the ternary logic designs and their performance analysis.

Keywords: CMOS, carbon nanotube field effect transistor (CNTFET), multi-valued logic (MVL) design, ternary logic, HSPICE

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Peer Reviewed | Published: 17 August 2018

Enhancing Biocompatibility and Corrosion Resistance of Ti-6Al-4V Alloy by Surface Modification Route

Tejinder Pal Singh Sarao, Harpreet Singh & Hazoor Singh

Journal of Thermal Spray Technology 27, 1388–1400 (2018) | [Cite this article](#)

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Abstract

Titanium (Ti) and its alloys are widely used as candidate materials for biomedical implants. Despite their good biocompatibility and corrosion resistance, these materials suffer from corrosion after implantation in biological environments. The aim of this research work is to study the effect of two coatings on biocompatibility and corrosion behavior of Ti-6Al-4V biomedical implant material. Hydroxyapatite (HA) and hydroxyapatite/titanium dioxide (HA/TiO₂) coatings were thermal-sprayed on Ti-6Al-4V substrates. In the latter case, TiO₂ was used as a bond coat between the substrate and HA top coat. The corrosion behavior of coated and un-coated samples in Ringer's solution was studied by potentiodynamic and linear polarization techniques. Before and after corrosion testing, XRD and SEM/EDS techniques were used for the analysis of phases formed and to investigate microstructure/compositional changes in the coated specimens. The cellular response was analyzed by the MTT

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Investigation of Schottky Barrier, Conventional and Tunnel Carbon Nanotube Field Effect Transistor for Low Power Design

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In past few years, the Field-effect transistor based on Semiconducting Carbon Nanotube (CNT) have generated the consideration for low power device due to its quasi-ideal electronics properties and high-level performance. In this paper, a comparative study of Schottky Barrier, Conventional and Tunnel Carbon Nanotube Field Effect Transistor (CNTFET) is presented based on operation, characteristics and structure. These three devices are simulated using Nano TCAD VIDES for double gate planar geometry and 3-Dimensional structures. The results are presented based on the performance parameters like On current (I_{ON}), Off current (I_{OFF}) and the ratio of On current to Off current (I_{ON}/I_{OFF}). Effective Performance is analyzed with variation in Drain to source voltage V_{DS} , Channel length (L_G), Diameter (D) and thickness Oxide (T_{OX}) keeping other parameters constant. From the simulated results it has been observed that Tunnel Carbon Nanotube Field Effect Transistor (T-CNFET) delivers the best performance as compared to Conventional, Schottky Barrier i.e., maximum $I_{ON}/I_{OFF} = 6.88E + 08$ at $V_{DS} = 0.1$ V, $L_G = 20$ nm, $T_{OX} = 1$ nm and $D = 1$ nm.

Keywords: CARBON NANOTUBE; CONVENTIONAL CNTFET; NANO TCAD VIDES; SCHOTTKY BARRIER CNTFET; TUNNEL CNTFET

Document Type: Research Article



International Journal of Quantum Information | Vol. 15, No. 01, 1750008 (2017)

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Construction of new quantum MDS codes derived from constacyclic codes

Divya Taneja, Manish Gupta, Rajesh Narula, and Jaskaran Bhullar

<https://doi.org/10.1142/S0219749917500083> | Cited by: 3

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Abstract

Obtaining quantum maximum distance separable (MDS) codes from dual containing classical constacyclic codes using Hermitian construction have paved a path to undertake the challenges related to such constructions. Using the same technique, some new parameters of quantum MDS codes have been constructed here. One set of parameters obtained in this paper has achieved much larger distance than work done earlier. The remaining constructed parameters of quantum MDS codes have large minimum distance and were not explored yet.

Keywords: Singleton bound • Hermitian construction • BCH bound • quantum MDS codes • dual containing constacyclic codes

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