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MILITARY APPLAUDS HIT



Officers from the Zimbabwe Defence Forces Staff College for the Joint Command and Staff Course Number 27 during a tour of the Institute's Pharmaceutical Technology Department.

The Harare Institute of Technology has been applauded for playing a critical role in national security by focusing on technology development, transfer and commercialisation thus fostering a culture of innovation and technopreneurship that creates a solid national defence system against technological threats from outside.

Speaking after a tour of HIT by the Zimbabwe Defence Forces Staff College students for the Joint Command and Staff Course Number 27, Zimbabwe Staff College Commandant, Brigadier General Augustine Chipwere said the issue of technology fits well into the whole mantras of national security and defence, adding that willingness to embrace evolving science-based technologies is an essential element of a successful military, hence the need to keep officers abreast with current research and innovations in technology.

"We as the military are no longer concerned about military threats only, but there are also issues that come through other avenues. You can have a country being destabilised just through the political avenue or through the economic avenue and even through the cultural avenue, you can also have a cultural invasion into a country and you are destroyed", said Brigadier Chipwere.

He added that there is the aspect of

technology which they emphasise to their students and this is where HIT comes in: "as a nation we have to plan how we safeguard ourselves against technology that is coming from outside the country. Some of these things we just buy off shelves from outside and bring them have got a serious impact in terms of retarding our national economic development and subsequently as we proceed to do that we create unemployment that degenerates into a lot of political and social strife creating national insecurity within the country", he said.

"But I think the other angle which this institution is focusing on which is innovation, creates a defence mechanism because once we are innovative and start creating our own technology, then we create a defence wall to support the nation and this is why other nations are as powerful as they are because they are developing their own technologies and things instead of going out to buy off shelves.

"Let's buy but let us also do some reverse engineering, so that we benefit from what others have developed and we perfect on that" he said.

Brigadier Chipwere also emphasized that modern day defence forces need to be almost into everything so that they play their role and give advice to make sure that the nation is secure because the avenues of threats to a

nation have multiplied and it is really becoming a major problem as to how to effectively secure a country against all the threats coming from various angles. "Today's interaction exposed us to research and innovation which is critical in the realisation of national programmes and development", he said.

As part of efforts to broaden knowledge of army officers on the impact of science and technology towards economic development of a country, officers from the Zimbabwe Defence Forces and their allied counterparts from the SADC region toured HIT which is one of the country's universities specialising in technology development, transfer and commercialisation.

The Acting Vice Chancellor, Engineer Quinton Kanhukamwe said the Institute is ideal for showcasing what the country's tertiary institutions are capable of offering in terms of research and technology.



Brigadier General Augustine Chipwere, Commandant Zimbabwe Staff College



HIT GETS AWARD FOR EXCELLENCE FOR THE YEAR 2013

In recognition of its growing reputation as a hands-on and practical oriented degree awarding institution, the Harare Institute of Technology has received yet another Award for Excellence for the year 2013 at a Megafest National Business Awards ceremony held at Rainbow Towers in Harare. The award is an acknowledgement of the commendable research work being done by the University that will benefit the Zimbabwean industry and society.

The award was presented to the Institute's Acting Vice Chancellor, Engineer Q.C. Kanhukamwe, who was accompanied by his senior management team.

In their citation during the awards ceremony, Megafest Holdings noted that Harare Institute of Technology has been doing a number of researches that will transform the Zimbabwean industry and as such they deserve this recognition. Apart from that, the Institute's Technology Centre, a unit set to

promote the development of manufacturing activities across academic departments in an inter and multidisciplinary approach, provides a platform for students to turn their capstone design projects into prototypes collaborating with players in the Mining, Agriculture, Industry and Commercial sectors in solving some of their problems.

Commenting on the award, Eng. Kanhukamwe said he was glad that the community continues noticing and appreciating the important national role HIT is playing: "I am very glad that though we are a very young university we have managed to show and dared to be different. With limited resources we are charting a path that will have a significant national impact. This award is a recognition of the team spirit and efforts of all of us," he said

Megafest is a Bulawayo based company with a Business Council arm that confers awards to excelling corporate bodies and individuals

from different sectors of the economy. The council calls for nominations, which are done through its network events biannually. An adjudication panel (apparently of adjudicators that don't know each other) then goes through the submissions to select the winner.

An extensive background research on the company and individuals is then conducted. The final and most important step in its selection process is to research and discern an owner/operator's reputation in the community, based on a factual track record.

Some of the organizations that were also awarded at the ceremony include, CBZ Bank Limited, MBCA Bank, Standard Chartered Bank, NetOne, Zimra, Liquid Telcoms, Avenues Clinic, Zimpapers, Fawcett Security, Mimosa and the Great Zimbabwe University.



HIT Acting Vice Chancellor Eng. Q.C Kanhukamwe receiving the MEGAFEST AWARD FOR EXCELLENCE FOR THE YEAR 2013 and later on accompanied by some the HIT Senior members of staff.



PUBLIC LECTURE - GLOBALISATION, THE TRANSFORMATION OF THE MARKET AND AFRICA'S INTERNATIONAL TRADE IN THE 21ST CENTURY.



Professor Peter Ndege from Moi University (Kenya) during the Public Lectures held at the HIT campus and at the Meikles hotel and some of the guests who attended the two public lectures.

The Harare Institute of Technology's School of Business Sciences in collaboration with the British Council successfully held a Public Lecture addressed by Professor Peter Ndege from Moi University of Kenya.

The topic of the Public Lecture was on Globalisation, The Transformation of the Market and Africa's International Trade in the 21st Century and was held on Campus and at the Meikles Hotel to accommodate the entire HIT Community and as well as business scholars, industry and commerce.

Professor Ndege's presentation touched on how globalisation has affected the market and Africa's trade by evaluating Africa's position in international commodity trade.

He argued that globalisation's promises have largely not been achieved in Africa and this situation is likely to persist for a long time to come mostly because the institutions that are concerned with globalisation, trade and the economic fortunes of the world such as the state, World Trade Organisations, International Monetary Fund, World Bank and Multinational Corporation are simply engaged in the furtherance of their own economic interests.

"And indeed in the interests of the world's richest and powerful persons. These institutions ensure that the global market and trade operates in an asymmetrical bias based on unequal exchange, meaning African countries cannot trade on an equal footing. Economic relationships in the concept of globalisation are asymmetrical", he argued.

Professor Ndege also observed that of late many African countries have now turned their focus on trading with the East, increasing their trade with China and this has only heralded mixed fortunes.

According to Professor Ndege, Globalisation is not just a process but a unique project by developed countries to intensify the integration of the developing countries like the rest of Africa into a more exploitative capitalist international system that has led to Africa's marginalisation. That integration has marginalised Africa more and more and this has manifested into the decline in western investment volumes of trade, high levels of economic aid and technological assistance to the region, capital flights and brain drain from the

continent.

Nevertheless, Professor Ndege also argues that globalization also embodies for Africa many opportunities because Africa can now relate easily with the rest of the world more than before. "Africa should take full advantage of the opportunities offered by Globalisation and minimize the threats", he said.

He added that there is need to reform the states, both African states and the developed Western states to be transformed by developing and nurturing strong democratic ethos formulating national democratic agenda, establishing and nurturing democratic institutions, electing visionary and committed leaders and enhancing institutional, technical and managerial abilities.

Africa countries need to strengthen their civil societies, transform their economies and establish indigenous African development agenda. African countries' National policies should aim at increasing every person's income and economically empowering African people as well as strengthening their domestic markets making their economies eco-dynamic having an impact on production and employment.

African countries also need to put more emphasis on agriculture as well as developing competitive manufacturing sector that is export oriented. Regional and continental cooperation must be strengthened, as is happening in the Americas, Caribbean, Europe, and Asia. Africa should also broaden its membership to the World Bank because currently Africa is not represented and also improve the deliberations and legal capacities of African representatives.

There must be a limit on the influence of multinational corporations involvement in the World Trade Organisation matters as well as emphasising the principles of equity, fairness and justice in the practices of the WTO. The World Trade Organisation must respect trade related aspects of Intellectual Properties as a lot of Intellectual Properties are being stolen in the very eyes of the WTO.

African countries need to convince multinational Corporations to issues of social and economic responsibility and use part of the profits they earn to help African countries improve their environments and

building schools and hospitals.

There is need to engage with the WB and IMF to make them more responsive to Africa's concerns by allowing African countries to engage in greater participation within the WB and the IMF. African countries should also occupy permanent positions in the institutions.

Africa should demand debt forgiveness or 'reparations'. The IMF and the World Bank must also improve their responses to crisis to avoid badly designed assistance and poorly implemented economic structural adjustment programmes in African countries.

The African business community has a big role to play in creating a better Africa by transforming the situation through engaging in a transition from 'market driven' operations. Instead of being influenced by the market, the businesses must themselves influence the market to 'market driving' by being more visionary, educating customers about their products, using the vast marketing channels to reach out to their clients, creating broad attachment and loyalty with the existing products and being sensitive to customers through value added products.

Africa also needs to adopt specific strategies and flexibility, risk taking and innovation, competitiveness, creating new businesses as well as experimenting with innovative ideas. There is also need to be tolerant to mistakes and learn from the mistakes.

African employees must also be empowered and there should be a generation of 'market driving' strategies.

"We cannot quit globalization it's a reality and we should not create an economic isolation as we should take the advantages and opportunities availed to us by globalization. Africa should also influence the trends and nature of our relations with the rest of the world. Let's not sit back and let the Western world, IMF, WTO, G8, EU and, WB determine the nature and terms of our relations. We should not be subsidiaries but also establish the terms of our economic relations with them.

"In short, we are involved in a more concerted war, that is my idea of the second Chimurenga. It is an economic Chimurenga!" he concluded.

The Technology Centre has announced a research team to expedite research on the already developed Natural Conventional Solar Driers with the aim of improving efficiency and ultimately patenting.

The team is led by Dr. P. Muredzi, Dean of the School of Engineering and Technology with the HIT Acting Vice Chancellor Eng. Q.C Kanhukamwe as an ex officio member, Eng. N. Chirinda, Director of the Technology Centre, and experts Mr Chamunorwa from the Electronics Engineering Department, Gwala, Mudyiwa, and Kwiri from the Food Processing Technology Department.

The following support technicians have been co-opted to work with the abovementioned research team experts:

- Mr. Ngwarati -Manufacturing
- Mr. Gweshe -Electrical
- Ms. Denhere -Food Processing
- Mr. Katsande -Food Processing

THE SOLAR DRIER MODEL

The solar drier design is a hybrid, forced convection, solar thermal (ST) and photo-voltaic (PV) cabinet solar that exploits energy from the sun (renewable energy) to heat air through thermal solar collectors.



The aspects of innovation include the introduction of the PV solar electronic temperature control device to regulate the drying temperature in the cabinet. This allows for uniform drying conditions resulting in high quality dried fruits and vegetable products.

Extractor fans were included to aid the natural convection currents, which are created by density differentials when thermodynamic fluids (in this case heated air) are heated.

The materials used in construction, the size (commercial) and the drying capacity make this particular solar drier outstanding.

Atmospheric air enters the solar collectors

and rise up a calculated incline.

The incline allows for maximum harvesting of the sunrays to heat the air entering the collectors. The sunrays penetrate the glass surface of the collectors since they are in the form of short wavelength rays and heat a special absorbing surface at the base of the collectors.

In turn the heated surface radiates heat waves of the longer wavelength range, which are unable to penetrate the glass cover thus they get trapped (greenhouse effect). This heats the air, which rises up the incline into the drying cabinet where the product is laid on drying shelves.

Extractor fans will suck the heated air up through the product and expel it through the top of the cabinet. As the hot air rise up through the product it carries with it moisture from the product by virtue of its psychometric properties.

The drier has a capacity of drying a batch of 100kg of cabbage in 48 hours or less depending on the intensity of the sun. Other vegetables and fruits can be dried for extension of shelves life of farm perishables, value addition as well as minimizing loss during a glut.

CONCEPTUAL DESIGN FRAMEWORK FOR DEVELOPING A CYLINDRICAL ROBOT MANIPULATOR FOR MATERIAL HANDLING IN ZIMBABWEAN SMALL TO MEDIUM ENTERPRISES: A FINITE ELEMENT APPROACH

Rujeko Masike, Talon Garikayi, Godfrey Tigere

ABSTRACT

In many small to medium engineering companies in Zimbabwe the need for material handling devices has become a necessity. There is lack of machinery that could increase production rate, improve product quality and reduce manufacturing costs while maintaining safe working environments. Material handling is a bottle neck during production due to lack of proper equipment and plant layout thus this research seeks to improve the material handling system through the conceptual design of a framework for the application of a cylindrical robot. There are many robots in the market that will improve material handling effectively.

The purpose of this paper is to present a framework that has a structured approach for developing cylindrical robots based on finite element analysis methods that will be used by small and medium engineering enterprises (SMEs). This will enable the SMEs in developing nations to maintain competitive prices on products with minimal work accidents. The research explores the current literature and design approaches used to develop cylindrical robots. The paper also provides detailed methodologies to be used for structural analysis, component simulation and performance evaluation of the machine through finite element analysis (FEA).

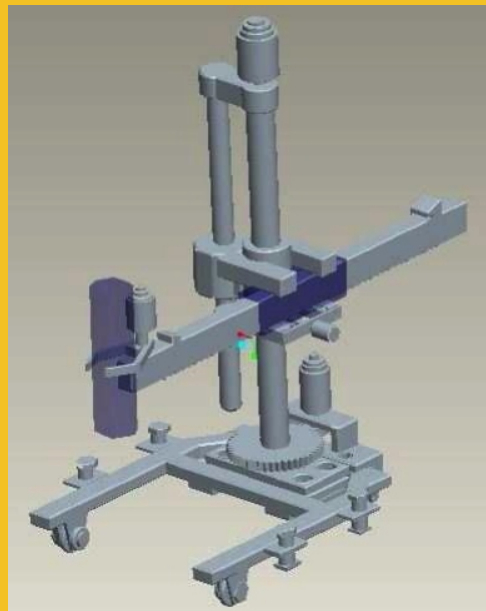
The framework provides suitable guidelines for designers to make appropriate decisions from the initial design stage to the commercialization of the design. The authors

conclude that the preliminary framework be applied to formalize design steps for similar material handling machinery implementation in the SME sector.

HYPOTHESIS

The researchers hypothesized that speeding up the material handling process will increase productivity and reduce cases of safety incidences.

MODEL DESIGN



The robot was designed based on existing robot models. A system comprising of different elements was designed and assembled. The system design was based on: reach arm design, load carrying platform design, welded joint design, column shaft design, column shaft key design, bearing selection, column bearing housing plates design, design of driving lead screw, design of rack and pinion for arm reach, radial motion gear design, pinion gear design and motor selection.

CONCLUSION

By means of the finite element analysis software AUTODESK INVENTOR®, the three dimensional finite element mechanical model was established. The design of a robot for material handling was presented. The robot manipulator was tested for loads up to 1500kgs and was capable of achieving the desired goal. The robot model was analyzed using INVENTOR® so as to determine stress and strain values to aid during material selection and sizing of the structure. To a greater extent the prototype developed was capable performing all intended tasks thus achieving the set objectives. However challenges had been on the interfacing between the robot and the hand held Human Machine Interface (HMI) for the operator. To resolve the challenge the researchers recommended the use of a wireless HMI for further optimization of the design.