



# ESME Focus

“Striving for the promotion of the art, science and practice of Mechanical Engineering in Ethiopia”

A Quarterly Newsletter

Published by The Ethiopian Society of Mechanical Engineers

Volume XI Issue No.5 September 2014

## NEWS IN BRIEF

### **Prospective Graduate Designs New Automatic Stamping Machine**

One of 2014/2015 AAiT prospective graduates of Mechanical Engineering, Bililingn Amare, has created a new design for an Automatic Stamping Machine together with his friend. The machine, when fully operational, is expected to produce about 36,000 stamped medicine stickers of three parameters. The machine has passed through three stages and the third and final stage is now ready for a prototype. (See the detail under the title Guest view)

### **ESME will launch a TV Program**

The long awaited TV program which ESME has been planning will soon become a reality in the coming months. An agreement for the production of two episodes for presentation to ETV and sponsors has been signed with Eternal Media and Promotion on October 4, 2014.

### **News from the Mechanical Engineering World**

#### **“Engineering for Global Development” Chosen as Theme for the ASME 2014 Congress**

Engineers have long contributed to human progress by solving complex challenges on a global scale. Many of these challenges are found in developing and emerging markets, particularly as they relate to critical infrastructures, such as access to energy, clean water, effective sanitation and healthcare. Rapid population growth and the global pursuit of sustainability are creating new demands for engineers who can design product, services and infrastructure to improve the quality of life for the billions living in poverty. Engineering for Global Development (EGD), a programs area within ASME, enhances the multidisciplinary research and collaboration needed to establish the delivery mechanisms for emerging and appropriate technologies.

**Ca Mellon, Pitt Researchers Combine Mechanics with Biology to Make Key Discovery About Communication Between Cells** PITTSBURGH-When the body forms new tissues during the healing process, cells must be able to communicate with each other. For years, scientists believed this communication happened primarily through chemical signaling. Now researchers at Carnegie Mellon University and the University of Pittsburgh have found that another dimension - mechanical communication - is equally if not more crucial. The findings, published in this week's issue of the Proceedings of the National Academy of Sciences, could lead to advancements in treatments for birth defects and therapies for cancer patients.

**ESME- An Opportunity To Attain Qualified Professionals!**

# NEWS IN BRIEF

"It's like 19th century scientists discovering that electricity and magnetism were the same force," said Lance Davidson, associate professor of Bio-engineering at the University of Pittsburgh, who co-led the study. "The key here is using mechanical engineering tools and frameworks to reverse-engineer how these biological systems work, thereby giving us a better chance to develop methods that affect this cellular communication process and potentially treat various diseases related to tissue growth."

"We answered this very important biological question by building a new tool that enabled us to see these mechanical processes at the cellular level." said Philip LeDuc, William J. Brown professor of Mechanical Engineering at Carnegie Mellon, who co-led the study with Davidson. The researchers developed a micro-fluidic control system that delivers chemicals at extremely low flow rates over very small, specific areas, such as integrated collections of individual cells. They hypothesized that in addition to using chemical signals to communicate with each other, regenerative cells also used mechanical processes - pushing and pulling on each other - to stimulate and respond.

"In order to identify these mechanical processes, we really had to control small parts of a multi-cellular tissue, which today's technology can finally allow us to do," Davidson explained. For example, a tissue sample two millimeters across may contain up to 8,000 cells. The micro-fluidic device enables researchers to "touch" as few as three or four and view the mechanical processes using a high resolution laser scanning microscope to view proteins moving in cells.

"We proved that mechanical processes are absolutely important along with chemical," LeDuc said. When the researchers disabled the mechanical connections between the cells using micro-fluidics, the ability of cells to communicate with each other dropped substantially. Although the cells communicated through chemical signaling as well, the cells' mechanical connections - their ability to push and pull on each other - were dominant in transmitting the signals.

Understanding this additional dimension could impact future research in tissue regeneration, from embryonic development to healing to cancer growth.

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## ENGINEERING ETHICS (Continued from March issue)

### Types of Responsibility

Different types of responsibilities exhibited in human transactions are:

#### 1. *Moral Responsibility*

Moral responsibility as applied to a professional: A professional must be responsible morally, in creating internal good or good outcomes, and eliminating /minimizing un- intended side-effects, from engineering and technology.

It includes:

- (a) *Obligations*: A commitment to moral actions (primary obligation to protect the safety of the human beings and respect their rights),
- (b) *Conscientious*: A comprehensive perspective to accept the duties, and diligently do the right things by putting their heart, head and hands (awareness of the experimental nature of the product/project, anticipating possible and unexpected outcomes and putting efforts to monitor them),
- (c) Accountability (being accountable for the decisions, actions, and the results of product/ project including safety), and
- (d) Praiseworthy/Blameworthy as applied to context of doing things right/doing things wrongly, respectively.

#### 2. **Causal Responsibility**

It is being a cause of some event. For example, a child playing with matches cause a house to burn. The child is causally responsible, but the parent who left the child with matches, is morally responsible.

#### 3. *Job Responsibility*

It consists of assigned tasks at the place of employment and achieving the objectives.

#### 4. *Legal Responsibility*

It is the response required by law and includes legal obligations and accountability to meet them. Many of these responsibilities overlap with moral responsibility.

## Responsible Professionalism

The most comprehensive virtue of engineers is responsible professionalism. It can also be called Professional Responsibility. This consists of five types of virtues, as follows:

1. Self-direction (Self-governance) virtues are fundamental and necessary in exercising moral responsibility. On the basis of 'understanding and cognition', it includes self-understanding, humility (proper assessment of one's character), and good moral judgment (termed as 'practical wisdom' by Aristotle). On the basis of 'commitment and action', it covers courage, self-discipline, perseverance, self-respect, and integrity. Honesty, a virtue common to both bases as it implies truthfulness in thoughts and words and trustworthiness in actions.
2. Public-spirited virtues focus on the good of the clients and the public. It includes the respect for rights (to make decisions and face the risk), non-maleficence (not harming others intentionally). Engineering codes go a step further and prescribe beneficence that includes preventing or removing harm to others and also promoting the public safety, health, and welfare, generosity (helping the community by voluntarily giving their time, talent, and money-voluntary service to the professional society and community), and justice (unbiased) in all decisions and actions.
6. Team-work virtues enable the professionals to work successfully with others. They include collegiality, cooperativeness, communicative ability, and respect for legitimate authority. Responsible exercise of authority and the ability to motivate other to achieve are also the relevant to team-work virtues.
7. Proficiency virtues, which mean the mastery of technical skills (called as Intellectual Virtue by Aristotle). It includes competence (having qualified, licensed, and prepared to execute the job that is undertaken), diligence (alert to dangers, careful attention, and avoidance of laziness or workaholic nature), creativity (learning to respond to the changing technological society), excellence (perform at the highest level), and self-renewal through continuing education.
8. Cardinal (chief) virtues: Wisdom (prudence), courage (fortitude), temperance and justice. Some of these may overlap other virtues. They are called 'cardinal' (Latin: cardo, hinge) because they are hinges on which all virtues depend. These are also called *moral* (Latin: mores, fixed values) because they govern our actions, regulate our passions, and guide our conduct according to faith and reason. Wisdom is perception of truth and ability to distinguish between the right and wrong. Courage means a firm and elevated mind. Temperance represents order in words and actions. Justice is preserving humanity and observing the faith of contracts. Although these virtues ring religious tones, they are very relevant to the engineering practice.

*The scholarship has helped me to concentrate fully on my education*

**Bililign Amare**



**Bililign Amare**

In this edition, we would like to introduce you to Bililign Amare, the prospective graduate of Addis Ababa University, Institute of Technology, Department of Mechanical Engineering, Mechanical Design Stream. Bililign was born and grew up in Semen Wollo (North Wollo) Zone, in a small village called Goby. He completed his elementary and secondary school in Semen Wollo zone. He joined Addis Ababa Institute of Technology in 2011. Bililign designed an Automatic Stamping Machine together with his friend Abel Tefera. Bililign Amare has briefed ESME Focus about his new design. Excerpts:-

**EMSE Focus:-** What initiated you to select Mechanical Engineering?

**Bililign:** - I was very much interested in things related to technical activities since childhood. When I was a small boy, I used to open and see the different parts of tape recorders. So I developed an inclination to wards mechanical things. I was first assigned to the Department of Chemical Engineering. I scored above 3.5 in the first semester and those who score 3.5 and above were allowed to choose any department. This gave me an opportunity to join Mechanical Engineering.

**ESME Focus:-** ESME has the information that you have designed a certain machine. What is that? And how did you come to create this design?

**Bililign-** The machine is called Automatic Stamping Machine. The reason I created this design is the practical problem I observed at the Ethiopian Pharmaceutical Manufacturing Share Company when I was there in apprenticeship. Stamping the three parameters on a medicine sticker, that is: the batch number, the manufacturing date, and expiry date was time consuming and needed too much manpower as each parameter had to be stamped one at a time. And for this, the company was incurring additional cost. The idea of creating the machine emanated from the problem and after discussing with my friend we agreed to solve it.

**ESME Focus-** What comparison is there to show the difference between the manually stamped sticker and the capacity of the machine you designed?

**Bililign :-** When you consider the need of the company, nearly 45,000-50,000 stickers per day, which requires 30-40 workers, you can imagine how costly and time consuming the task is. But the machine we designed will have the capacity of stamping about 36,000 (thirty six thousand) stickers within an hour. What the company does in two shifts, can be easily performed by the machine within two hours producing more than 70,000 stamped stickers.

**ESME- Focus-** Has the machine been made so far?

**Bililign :-** Not yet. We will prepare a prototype. After making the prototype, we will see whether it can be produced within the capacity of the industries in our country. If not, we will adjust the standard based on the manufacturing capacity of our industries because it is a simple machine that can be easily manufactured.

**ESME Focus :-**Have you encountered any problem while creating the design of the Automatics Stamping Machine?

**Bililign:-** Not as such. The only problem we faced was to get the sample papers of the stickers that the parameters were stamped on. But we solved it at last by creating good understanding with the company's staff.

**EMSE Focus-** Is this the final process of your design or does it require additional adjustments?

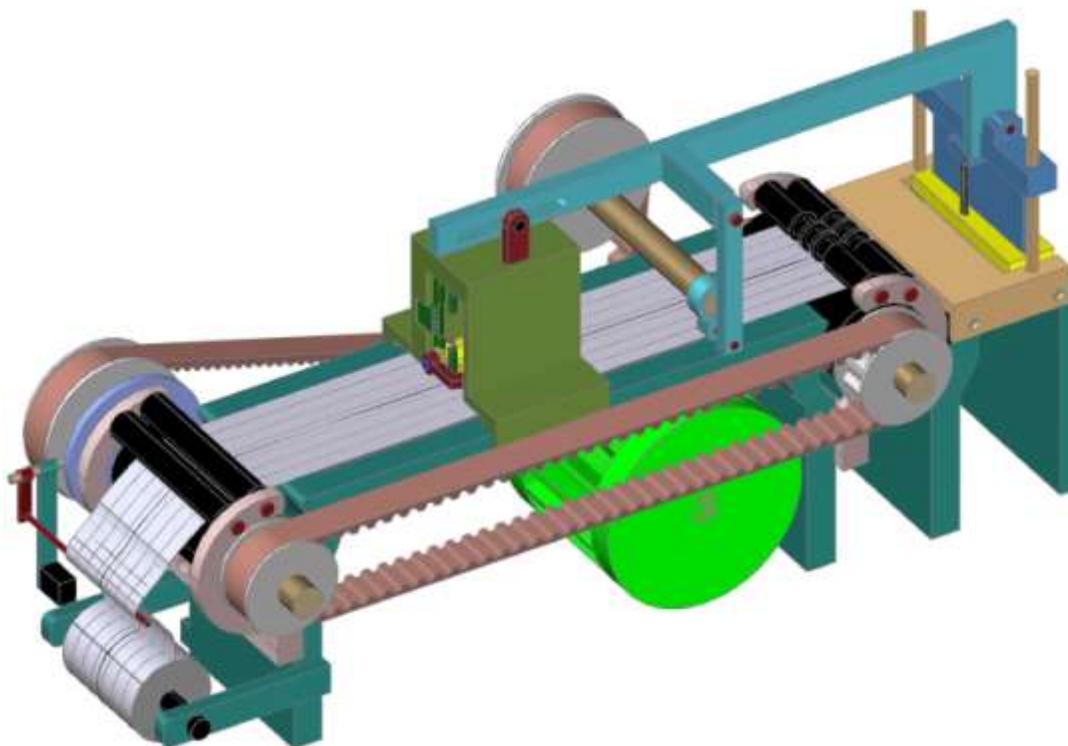
**Bililign:-** The design has passed through three stages. When it is evaluated in simulation, this third stage is satisfactory.

**ESME Focus:-** By the way, how did you come to know about the Ethiopian Society of Mechanical Engineers (ESME)?

**Bililign:-** To be honest, I hadn't heard about ESME until I read a notice about SINTEC ETHIOPA's scholarship. As I have strong belief in activities done institutionally more than individually, I was very much excited when I heard about ESME because more things can be accomplished when done in cooperation under an organization.

**ESME Focus:-** What is the effect of the scholarship you got through ESME?

**Bililign :-** It has helped me a lot. I could concentrate fully on my education. Had there not been this scholarship, creating the design at this stage would have been unthinkable. So, I am grateful to SINTEC and ESME. They will reap the fruit not from us individually, but from the result of our work which I hope will contribute to the development of the country.



**ESME Focus;-** What are you planning to do in the future?

**Bililign:-** I came from the rural area, from a family with farming background. In this regard, I have observed many things that could be solved by applying our profession. There are many possibilities to improve the productivity of the agricultural sector by helping farmers to use modern agricultural tools than doing things manually. If we improve the old style agricultural tools, our farmers will be more productive and efficient. In my opinion, it is we who should solve our country's problem. Who is going to come and work for us unless we ourselves take the initiative? I hope we will have a strong society that will facilitate the opportunity to utilize our knowledge and experience to the economic development of our country.

**ESME Focus:-** Thank you and we appreciate your creativity in designing the Automatic Stamping Machine which we hope will encourage many to follow suit.

**Bililign:-** Thank you for having me and this encourages me to do more in the future.

# Profile of Ethiopian Companies // Industries

The advertisement for National Alcohol & Liquor Factory is divided into three vertical sections. The left section features a blue diagonal banner with the text 'NATIONAL ALCOHOL' and displays several liquor bottles, including one labeled 'NATIONAL BEER' and another 'NATIONAL LIQUOR'. Below the bottles is a white truck with a colorful trailer. The middle section is titled 'NATIONAL ALCOHOL & LIQUOR FACTORY' and shows a row of bottles on a beach with a yellow umbrella. Below this is a blue box with the text 'QUALITY PRODUCTS FROM A NAME YOU CAN TRUST "NATIONAL"'. The right section features the company logo (a deer in a circle) and the text 'NATIONAL ALCOHOL & LIQUOR FACTORY'. Below the logo is a large image of a beach with thatched umbrellas and a row of bottles in the foreground. At the bottom right, contact information is provided: ADDRESS - TEL: 251-11-515-6190 / 251-11-551-4478, P.O. BOX: 3518 FAX 251-11-551-3299, E-mail: national.alcohol@gmail.com, info@nalf.com.et, Website: www.nalf.com.et, Addis Ababa- Ethiopia. A responsible drinking message is also included: 'Please Drink Responsibly! Not for sale to persons under the age of 18'.

## COMPANY BACKGROUND

National Alcohol and Liquor Factory, the first of its kind in Ethiopia, was established in 1906 by private owner. The company, now comprising two branch factories, was nationalized in 1976 at different corners of Addis Ababa.

The company was pioneer and engaged in the production and distribution of pure alcohol and various alcoholic drinks to local and export market, such as USA, Australia, Israel and South Sudan. Along this the company has developed strong market image and built its customer's confidence in the beverage sector

## VISION

We aspire to be the best alcohol and liquor products producer and distributor in the local market and become competent in the export market.

## MISSION

To fully satisfy our customer's needs and expectation by producing high quality alcohol and liquor products consistently using modern technology, applying modern management system and employing experienced and qualified professionals and also satisfy other stakeholders by creating value as well as enhancing the well- being of the society and protecting the environment to contribute our share for the growth of our country.

## PRODUCTS

1. Liquors (Alcoholic drinks )
2. Pure Alcohol
3. DENATURED ALCOHOL