



NERDC NEWS

Newsletter of National Engineering Research and Development Centre of Sri Lanka

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Rising to the challenges: Re-launch of firewood fueled stoves & biomass rice cooker

Supply constraints in LP gas, electricity, and kerosene oil have created a catastrophic crisis in today's world, throwing regular living on its head. This crisis has made it more difficult for individuals to go about their daily lives than ever before. Finding solutions to energy crisis in the kitchen is a critical component of tackling these problems. In light of the situation, NERDC prepared a re-launch of wood stoves on its grounds. The event was held on March 22, 2022, and prominent attendees included Deputy Director General (Services) CEng. A.A.S.P. Jayasinghe and Deputy Director General (R & D) CEng. J.A.D. Jayasooriya. Ms. Mihidulie Jayasekara, Assistant Director for the state Ministry of Rattan, Brass, Pottery, Furniture, and Rural Industries Promotion, was also in attendance. In addition, more than 20 Science and Technology officers were invited to learn about these technologies in order to inspire young entrepreneurs to develop and sell these items at the village level. Apart from them, more than 50 micro, small, and medium-scale businesses from Western province took part in the search for licensing prospects for these items. Lake House, Upali Newspapers Ltd, Wijeya Newspapers Ltd, and Independent Television Network provided press and electronic media coverage. There are various varieties of firewood-fueled stoves that are used for different reasons, including domestic use. On this occasion, the biomass rice cooker, wood gas stove, industrial stove, and mini-kitchen were re-launched. These stoves are a great answer to the present energy crisis because of their high efficiency, user-friendliness, simplicity, and affordability. End users' and entrepreneurs' views and comments will be used to improve the quality of products.

NERDC held a special workshop on Research & Innovation for Sri Lanka Navy Officers

At the request of the Sri Lanka Navy, the NERDC organized a special session on research and innovation. A full-day course at NERDC Technology Park comprised a series of lectures and specialized demonstration sessions, as well as a visit to the NERDC Technology Park Engineering Museum, separating in to two independent groups. These workshops were designed to introduce and demonstrate NERDC's technologies and processes, where the participants could get the total exposure. The first lecture, which focused on Research and Innovation, was delivered by Dr. Anurudhdha Thammita, Head of the Mechatronics Department. The idea generation, importance of innovations to develop an economy & how the research can contribute in improving innovations. Eng. Hemantha Kumara, Principal Research Engineer, conducted his lecture on commercial product development and technology transfer.



How a prototype could be developed up to a commercial level product which should make available in the market was discussed in the lecture. Further he was discussing few important points on technology transfer process, specially focused on advantages of such procedures in developing technological interventions among SMEs. Eng. Yamuna Pathiraja, Head of the Techno Marketing Department, delivered a lecture on patents and intellectual property related issues. During this lecture patent search process, applications and how intellectual properties of innovations are secured through patents were discussed.



There were 24 officers, who took part, and they all went to the Technology Incubator to learn about CNC machines and other processes & activities designed to help new innovators.

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Innovations are driven by industry demand: Exploring new research opportunities in emerging construction technology

NERDC hosted a brainstorming session with stakeholders to explore possible research areas and challenges in the construction sector for which research efforts may give answers. Two keynote addresses from two key personalities in the construction sector were presented during the event. Prof. S.M.A. Nanayakkara, Senior Professor, Department of Civil Engineering, University of Moratuwa, spoke about "Building Materials" to highlight research gaps and



future prospects for sustainable construction materials and technique. Eng. (Dr.) Asiri Karunawardena, Director General of the National Building Research Organization (NBRO), gave a presentation on "Geotechnical Engineering for Infrastructure and Development" to identify research gaps and issues related to geotechnical engineering's use in infrastructure and development. Stakeholders contributed to the conversations by expressing their thoughts, requesting research, and sharing their experiences. This event provided opportunities for further discussions with interested stakeholders about research and development efforts, as well as potential joint research possibilities.



The Civil Engineering Department of NERDC hosted this half-day brainstorming workshop on March 8, 2022, at the Institution of Engineers Sri Lanka (IESL) in Wimalasurendra Auditorium. The State Ministry of Skills Development, Vocational Education, Research & Innovation is represented by Mrs. Deepa Liyanage, the Secretary to the State Ministry; Mr. P.M. Dharmathilake, the Director General (R & D); and Mrs. K. Meegahakotuwa, the

Director General (Planning). The Chairman, Director General, and members of the NERDC Board of Directors were invited by the director of the NERDC civil engineering department, who was in charge of organising the event. Eng. Parakrama Jayasinghe, an energy specialist, was also among the private and government experts.

NERDC supports to improve teaching skills of Mathematics teachers using the “Maths Cafe” at Technology Park

A recent skills development session for mathematics school teachers in the North-Western Province was held at the Maths Cafe at the NERDC Centre's Technology Park. This was a special workshop organized by the State Ministry of Skills Development, Vocational Education, Research & Innovations in collaboration with "Nipunatha Udanaya," an initiative aimed at encouraging young people to develop their skills and explore informal education options



throughout the country. The Commercial Bank of Ceylon PLC sponsored this workshop. Mr. Darmasiri Hengamage, the inventor of the Maths Cafe Program, led the program, while the personnel of Technology Park gave necessary support and assistance throughout. In all, 80 school teachers attended two workshops where they were taught new skills and approaches for teaching mathematics in a practical manner with more student involvement.

Performance of a unique technique: NERD Centre demonstrates preparation of smoked fish using NERDC smoked fish processing unit & its' technology

NERDC presented a smoked fish processing demonstration, utilizing the smoked fish processing device that the centre built. This was organised by the Udawalawa Fisheries Society for its members and the fishing community in the Udawalawa reservoir area. A full-day demonstration was organised on March 26th, 2022, with more than 50 participants.



Contribution to the economic growth of society: Establishment of "Business Forums"

The Small and Medium Enterprise Development Division recently held a series of programmes in two divisional secretariats in order to build a "Business Forum" to assist all SMEs in the appropriate areas. The major goals of these forums are to provide SMEs with needed services, intermediates, supply chain, and technical interventions, as well as to help them address problems by offering quick assistance from the government, business sector, and financial institutes. The resource panel included Divisional Secretaries, Grama Niladharies, and Economic Development Officers in divisional secretariat officers; politicians from relevant areas; officers from the Bank of Ceylon, Peoples' Bank & Commercial Bank, ITI, SLSI, and NERDC; and officers from the Bank of Ceylon, Peoples' Bank & Commercial Bank, ITI, SLSI, and NERDC. The NERDC awareness workshop on these programmes was delivered by Mr. Muditha Gunawardene, Marketing Officer around 150 SMEs participating in the Negombo programme and about 125 SMEs engaged in the Attanagalla programme.



Miracles of technology for day to day life: NERD Centre holds a workshop on Biogas digesters manufacturing for Agriculture Promotion Officers

An awareness workshop on the production and use of biogas digesters in farm-based industries was organized on March 29th, 2022, at "Govi Maha Gedara" in Kurunegala.



The goal was to educate Agriculture Promotion Officers in North Central Province on biogas unit manufacturing, maintenance, and use in micro, small, and medium-scale farms and farm-based other sectors. They were educated of the extra benefits of establishing these two sorts of units: industrial and household, particularly in the context of the present energy crisis. The workshop was hosted by the North Central Province's Ministry of Agriculture, Irrigation, Fisheries, Animal Products & Health, and Agrarian Development, Marketing Officer Mr. Muditha Gunawardene and one of the biogas specialists, Eng. Sunil Karunawardene, from the NERDC. This one-day programme drew a total of 50 people, including 40 agriculture promotion officers.

What is Bernoulli's Principle?

Daniel Bernoulli, known as the "Father of Mathematical Physics," first defined the relationship between pressure and velocity in moving fluids (liquids and gases) in 1738. Bernoulli's Principle, often known as the Bernoulli Principle, has applications in aviation (aircraft flying) and hydraulics (flow of liquids in pipes, channels, etc.).

Bernoulli's Principle is only valid under a few specific situations, which are listed below.

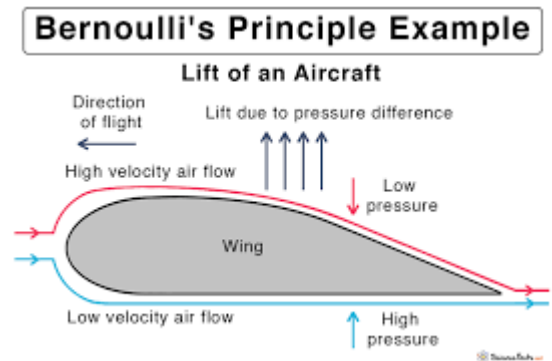
- It refers to fluid bodies whose whole mass of flow is contained within a stream-tube in a tube of any shape with a uniform or variable cross section or curvature, within which all streamlines or flow patterns of the fluid particles are contained.
- The fluid is incompressible (the volume of the fluid does not change under pressure exerted upon it).
- The liquid is viscous but not viscous (there are no fictional forces).

If any cross section of the stream-tube is normal to the fluid flow under the above conditions, then if any cross section of the stream-tube is normal to the fluid flow under the above conditions, then

$$P + \frac{1}{2}\rho V^2 + \rho gh = \text{Constant per unit volume of fluid}$$

P = Pressure, ρ = Density, g = Acceleration due to gravity, v = Velocity, h = Elevation above a fixed horizontal datum

Bernoulli's Principle is applied to the system where the aero foil is exposed to the air stream. In relation to the air stream, the upper surface of the aerofoil is convex, while the bottom surface is virtually flat. As the air rushes past the leading edge of the aero foil, it splits into two streams: one above the aero foil and the other below, which combine into one air stream just before the trailing edge after traversing the length of the aero foil. Because of the aerofoil's shape, the air stream above it must go a greater distance in a given time period than the air stream below it. As a result, the air velocity above the aerofoil will be higher than below it.



When applying Bernoulli's equation, the velocities of air above and below the aero foil are V_1 and V_2 respectively, and the pressure is P_1 and P_2 ;

$$P_1 + \frac{1}{2}\rho V_1^2 + h_1 \rho g = P_2 + \frac{1}{2}\rho V_2^2 + h_2 \rho g$$

Since the density of air ρ and $(h_1 - h_2)$ are small compared to the other terms, the equation now reduces to;

$$P_1 + \frac{1}{2}\rho V_1^2 = P_2 + \frac{1}{2}\rho V_2^2$$

$$P_1 - P_2 = \frac{1}{2}\rho (V_2^2 - V_1^2)$$

Since V_1 is greater than V_2 , as shown earlier, P_2 is greater than P_1 . Hence, there is an upward lift on the aero foil.

The NERDC announces a small-scale sodium hypochlorite generator



Cleaning surfaces that come into touch with people is a good way to prevent infections from spreading. One of the most often utilized chemical substances for this purpose is sodium hypochlorite (NaOCl).

By electrolyzing crystal salt, NERDC built a specialized device to create NaOCl. This small-scale electrolyzer employs graphite electrodes and has a 10 litre hold-up chamber. This was created as a proof-of-concept.

The sanitizer concentration required is determined on the type of germs to be removed. In 45 minutes, the designed unit generates 10 litres of NaOCl with a concentration of 1000 ppm and a PH of 10–11.

Dr. Kasthurirathne shares his expertise with NERD Centre professionals

In order to enhance the knowledge & exposure into various disciplines, series of monthly research presentations are conducted for the research staff of NERD Center. Another presentation of this series was held on 28th March 2022 at Kulasinghe auditorium inviting an external resource person.

The topic of the session was “Optimization in Engineering Applications” & delivered by Dr. Dharshana Kasthurirathne, who serves as Assistant Professor at School of computing in University of Colombo. The senior management, all engineers & executives of NERDC participated the session.



Peer learning knowledge shared by internal professionals of NERDC



Three internal presentation sessions were arranged during the past two months to share expertise & improve knowledge based exposure of engineers & technical staff of NERD Centre. The first session was conducted by CEng. Shalinda Silva on 08th March 2022 and the topic of the presentation was “Uses & Applications of Coconut Tree”.



Pertaining to the above lecture series the second lecture was scheduled on 22nd March 2022 under the topic of “Basics of Biogas Technology & its domestic applications” conducted by engineer Sunil Karunawardene, biogas expert in NERDC. He explained how this technology can be used as an ideal solution to the energy crisis arisen today.



The third presentation “What is mathematical modeling, its advantages & limits” was conducted by Research Fellow CEng. Kapila Pieris on 19th March 2022. The senior management, engineers & technical officers participated to these sessions and many ideas were shared & discussed.

NERD Centre holding hands together with SANASA International to uplift the palmyrah juice industry in Jaffna district

SANASA International (PVT) Ltd is a subsidiary of the SANASA Group that works closely with small and medium-sized businesses to help them develop to the next level. SANASA International (PVT) Ltd. recently hosted a business networking event to help palmyrah juice farmers boost their production through technology interventions and market connections. The Assistant Director (Marketing) led a zoom session on NERDC-developed tailored technologies, explaining their benefits and why these technological interventions are critical to industrial success. Mrs. Samadaane Kiriwandeniya, SANASA's Managing Director, Mr. N. Bandara, SANASA's Business Incubation Specialist, and other top SANASA officials attended the meeting. The session, which took place in Jaffna on April 28th, 2022, included a buyer from Colombo and roughly 25 palmyrah juice manufacturers. SANASA was expected to implement a unique programme in partnership with the NERDC licensee to give technological support to these SMEs. As a result, the licensee's contact



NERDC encourages new construction enterprises by holds training in cement soil block manufacturing

On the 10th March and 29th of April, 2022, NERDC hosted two training sessions for chosen micro and small-scale businesses on "Compressed Stabilized Earth Blocks Manufacturing." Two hours of extensive lectures were followed by full-fledged demonstrations in those two programs. There were also practical workshops in which the participants were actively involved. The lectures were given by Ms. Anuruddhika Digala, civil engineer, and the practical sessions were led by the technical officers and their personnel. These are two distinct one-day programs with a total of ten participants that followed all national health criteria for Covid-19.



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