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THE SOUTHERN INDIA ENGINEERING MANUFACTURERS' ASSOCIATION

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MED 20 Sectional Committee along with MED20.5 and MED 20.6 on 24th January, 2024

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From the President's Desk

Dear SIEMA Members,

As we stepped into a new year, I wish to share some recent highlights from our activities and some upcoming challenges.

On January 24th, 2024, SIEMA hosted the BIS - MED 20 Sectional Committee meeting at our Coimbatore premises. Chaired by Shri Abdul Rahiman from CWPRS, the session sparked fruitful discussions. Dr. Murugesan, our esteemed Technical Committee Chairman, was the Convenor, with active participation from our Technical Members. This collaborative effort, jointly facilitated by SIEMA & IPMA, underscores our dedication to advancing industry standards.

We've also kickstarted the formation of an Export Sub-Committee to explore opportunities in the USA. Interested members are encouraged to reach out to the SIEMA Secretariat to participate in this initiative.

I would also like to highlight two crucial changes in legislation that directly affect our industry, for which members must be adequately prepared.

The Finance Act, 2023, has introduced a significant provision impacting MSME payment regulations. The insertion of clause (h) in section 43B of the Income Tax Act pertains to payment timelines to MSMEs. Any payment pending beyond 45 days from the invoice date to a micro or small enterprise will be disallowed as an expense. It's imperative to comprehend that non-compliance could result in artificial inflation of income, leading to additional tax liabilities. It's crucial to understand and comply with these regulations to prevent notices from Income Tax Department.

Furthermore, the Quality Control Order (QCO) for Cast Iron takes effect from February 24, 2024. ISI marking for Cast Iron products sold in India becomes mandatory from this date onwards. While SIEMA has requested a three-year postponement for QCO implementation, we'll keep you updated on any developments. I urge all members to ensure their foundry suppliers are adequately prepared for compliance to prevent any supply disruptions.

In closing, I extend my sincere gratitude for your unwavering support and active involvement in SIEMA's activities.

Warm regards,

D. Vignesh

Mission & Vision

To enable our members to compete globally with their products and services

- *To extend support to our member industries to prosper*
- *To offer up-to-date technical support to members*
- *To train and enable members to meet the global challenges in technology and competitiveness*
- *To develop techno-commercial co-operation with international enterprises*
- *To promote programmes for enhancing the quality of life of all stake-holders*
- *To represent members on common issues with the policy makers.*

The Southern India Engineering Manufacturers' Association
SIEMA Buildings, 8/4, Race Course
Coimbatore 641 018

Tel : 0422 - 2220014
Mobile : 98428 31147
E-mail : siema@siema.org

CIN No : U91110TZ1950NPL000184
GST No : 33AAATT6785H1Z5

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The opinions and views expressed in this magazine are those of the respective authors.

In this issue

SIEMA Activities Corner

Technical Calendar of Events (BIS/BEE)

Technical Committee meeting was conducted on 10.01.2024 at SIEMA at 5.00 pm and discussed about the agenda points for BIS Sectional Committee meeting at Coimbatore, SIEMA Board Room on 24th Jan. 2024.

Technical Committee meeting was conducted on 03.01.2024 through zoom and discussed on the issues regarding the operation and marking of IS standards IS 8034, 9079, 14220, and also about the Agenda of the forthcoming BIS Sectional Meeting to be conducted in the SIEMA Board Room on 24th Jan. 2024.

Weekly Technical Committee meeting was conducted on 03.01.2024 through zoom and discussed on the issues regarding the operation and marking of IS standards IS 8034, 9079, 14220, and also about the Agenda of the forthcoming BIS Sectional Meeting to be conducted in the SIEMA Board Room on 24 th Jan. 2024.

MED 20 Sectional Committee along with MED20.5 and MED 20.6 on 24th Jan, 2024

MED 20 Sectional Committee along with MED20.5 and MED 20.6 was conducted at SIEMA board room on 24th January 2024 . Our President Vignesh along with IPMA president K.V. Karthik welcomed the participants. The meeting was chaired by Shri Abdul Rahiman from CWPRS instead of Shri A. K. Nijhawan chairman MED 20. Dr.C. Murugesan our TC Chairman, Convenor MED 20.5 and Dr.R Birajdar VP - Design KBL Convenor MED20.6 convened the meeting along with Mr. Aman Dhanawat Member secretary. The complete agenda points were discussed and suitable decisions were taken.

The participants interacted well and also all of them appreciated the efforts of SIEMA and IPMA for the arrangements and hospitality.

An industrial visit was also organised by SIEMA and IPMA for the participants of the meeting to M/s Superteck Industries at Arasur. During the Visit our Vice President Sri. Ma.Senthil Kumar, briefed about the activities of the company to all the participants. All the participants appreciated and thanked for the industrial visit on 23rd January. Subsequent to the Industrial Visit participants also visited Sitarc and learned about the activities and services at SiTarc.

Vande Bharat Express Flagging Off

Vande Bharat Express between Coimbatore & Bengaluru Cantonment was flagged off by our Prime Minister Shri Narendra Modi through Video Conferencing.

President Sri. D. Vignesh attended the function.

Representation to Railways Department

Representations were sent to Shri. Ashwini Vaishnaw Ji, Honorable Minister of Railways, The Chairman, Ministry of Railways, Mr. R.N. Singh, GM Southern Railways, DRM, Madurai & DRM Salem, Railways Department regarding Restoration of Dindigul / Coimbatore / Dindigul Train number 0771/0772, unreserved / MEMU passenger Train service.

Meeting with Ernst & Young LLP

President Sri. D. Vignesh had a meeting with Ernst & Young LLP Sri. Shubham Arora - Lead Advisory and discussed the Logistics Survey for the Government of Tamil Nadu and Southern Railways

IPMA EC Meeting on 19th January 2024

President Sri. D. Vignesh along with IPMA President Sri. K.V. Karthik, Past President Sri. V. Krishna Kumar attended the IPMA EC Meeting held at Franklin Electric - Pluga Factory at Vadodara.

Stakeholders Meeting to discuss about the upcoming Technology Centre was held on 22nd January 2024 at Codissia City Office

Vice President Sri. Ma. Sendilkumar attended the meeting.

Felicitation Event for Coimbatore Police Commissioner on 24th January, 2024

SIEMA with CII, CODISSIA, CHAMBER & RAAC arranged for a felicitation event for the Coimbatore Commissioner on the evening of January 24th at CODISSIA Trade Fair Complex. Our President Sri. D. Vignesh addressed the meeting.

Noyyal Nokki Double Decker Bus ride

Siruthuli organised a Noyyal Nokki Double Decker bus ride on 6th Jan 2024. Our Vice President Sri. Mithun Ramdas, Vice President Sri. Ma. Sendhil Kumar and MC Members attended.

Meeting with NABL QCI

Meeting was arranged at SIEMA with NABL QCI. Immediate Past President Sri. K.V. Karthik, Technical Committee Chairman Dr C. Murugesan, Dr. K Ulaganathan - Director Si'Tarc & Mr. A.M. Selvaraj - Jt Director Si'Tarc had discussion with Mr. K. Soundirapandian, Deputy Director & Mr. Srikanth. R Director of NABL.

Numerical Analysis of Centrifugal Water Pump Impeller under Varying Loads

L Yadeta[1*], H G Lemu[2] and A K/M Tadese[1]

[1]Jimma Institute of Technology, Jimma University, Ethiopia

[2]Faculty of Science and Technology, University of Stavanger, Stavanger, Norway

* Correspondence: letamchengrju@gmail.com

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Abstract

Centrifugal pumps are widely used to move liquids from one place to another at varying pressure and flow rate, and to an elevated height for irrigation, water supply plants, and steam power plants. The load variations often lead to unpredictable performance of the impeller. The objective of this study is to investigate the performance of a three-stage centrifugal water pump impeller under varying loads using numerical methods. To conduct the investigation, a water pump used by Jimma town water treatment station, which operates with head of 191 m and discharges 439.2m^3/hr water was used as a case study. Computational fluid dynamics analysis of the pump was conducted using ANSYS 19.0 CFX to get the pressure distribution at different flow rates (60%, 100% and 140% of the design flow rate). The fluid pressure was then used to make static stress analysis of the impeller employing one way fluid structural interaction analysis for three different materials. The finding of the study shows that the fluid pressure on the impeller has great impact on the impeller performance causing high stress and deformation of the impeller.

Keywords: *Centrifugal pump, computational fluid dynamics, fluid-structure interaction, Navier Stokes equation, numerical analysis.*

1. Introduction

Pump is a mechanical device that applies energy to move liquids from one place to another at increased pressure, flow rate and to an elevated height. Irrigation, fire-fighting services employ pumps of different sizes[1]. Pumps and turbo-pumps are used in many technological areas and cover a wide range of applications such as thermal power generation, nuclear, propulsion, marine and water supply[2]. The pumps can be divided into two general categories, namely dynamic pumps and displacement pumps. In a dynamic pump, such as a centrifugal pump, energy is added to the pumping medium continuously and the medium is not contained in a set volume. The energy, in a displacement pump such as a diaphragm pump, is added to the pumping medium periodically while the medium is contained in a set volume. The pump is driven by a prime mover that is either an engine or an electric motor. The capacity of a pump is defined based on the pressure head (in meters) and the maximum delivery flow rate at a specific speed of the shaft[3]. Centrifugal pumps are one of the dynamic pumps which consists of a set of rotating vanes enclosed within a casing and is used to impart energy to a fluid through centrifugal force. Centrifugal pump is a device mainly used for transporting liquid from lower level to higher level. Centrifugal pumps convert mechanical energy from a motor to energy of a moving fluid, where some of the energy goes into kinetic energy of fluid motion, and the rest is converted to potential energy that is represented by a fluid pressure or by lifting the fluid against gravity to a higher level[4][5].

Centrifugal pumps are widely used for irrigation, water supply plants, steam power plants, sewage, oil refineries, chemical plants, hydraulic power service, food processing factories and mines, because of their suitability in practically any service. In pumps the mechanical energy is converted into hydraulic energy[6]. The two main components of centrifugal pump are impeller and casing. Centrifugal pump moves liquid by rotating one or more impellers inside a volute casing. The liquid is introduced through the casing inlet to the eye of the impeller where it is picked up by the impeller vanes. The rotation of the impeller at high speeds creates the centrifugal force that throws the liquid along the vanes, causing it to be discharged from it's outside diameter at a higher velocity. This velocity energy is converted to pressure energy by the volute casing prior to discharging the liquid to the system[7]. The second part of centrifugal pump is stationary element comprising the casing, bearings and seals. A shaft is used to support rotating components or to transmit power or motion by rotary or axial movement[7]. Mechanical component fails due to either a decrease in its strength or an increase in load acting on it. Failure of a component affects the performance of a pump, causing either a reduction in its efficiency or its complete breakdown. In industrial applications, the probability of occurrence of critical problems such as component damage and pump failure is high due to heavy loads and the demand for continuous operation of the pump. In such cases, the entire plant will have to be shut down until the pump is either brought back to service or replaced. In order to prevent huge economic losses incurred due to such a shut-down, a pump must function reliably under specified operating conditions[8]. Centrifugal water pump components are subjected to different loading conditions. It is also subjected to corrosion and corrosion assisted fatigue due to the operating or working environment.

In order to perform numerical analysis of centrifugal pump impeller, numerical calculations were performed by solving the 3D Navier-Stoke's and energy equations using the commercial code ANSYS CFX[9]. In the same study, steady-state analysis was performed using the κ-ω based shear stress transport (SST) model, which proved to give relatively accurate predictions in fluid machine analysis. Using an FSI analysis, it is possible to see the Coriolis forces and centrifugal forces generated by the impeller. FSI analysis is a multiphysics interaction between fluid flow and a solid structure. There are two ways to do an FSI analysis (1) one-way coupling and (2) two-way coupling. Benra *et al.*[10] employed one-way FSI coupling, in which the CFD results were transferred to the structural analysis, while in two-way FSI, the deformations in the structure obtained from the transfer of the CFD results are fed back to the CFD environment. The objective was to determine the deviation in the flow created as a result of the structural deformation. The study by Gu *et al.* [11] demonstrated the effect of FSI on rotational forces. The study indicated that fluid pressures significantly affect von-Mises stress.

Kobayashi *et al.*[12] investigated a mixed-flow pump with an unshrouded impeller by one-way coupled FSI, and the distribution of stress on the impeller was obtained. Piperno *et al.* [13] concluded that to ensure the safe operation of a rotating structure for every flow rate, the analysis of stress and deformation on the impeller in the unstable operation region needs to be solved by the consideration of FSI. Kang and Kim[14] pointed out that structural safety needs to be evaluated because the impeller receives fluid pressure load and centrifugal force during the operation. Even though different researches were conducted, many of them focused on centrifugal compressor impellers and less study was conducted on the FSI stress analysis of centrifugal pump impeller. This study focuses on one-way FSI stress analysis of three stage centrifugal water pump impeller. It is case study of Jimma town water treatment station, which is located at Boye and pumps water with head of 191 m and 439.2 m^3/hr discharges.

2. Methodology

Actual design data about the specification of a given centrifugal water pump was collected from the Jimma town water treatment station located at Boye. Based on the collected data, the 3D model of the centrifugal water pump shaft, impeller and return guide vane was prepared by using ANSY 19.0 geometry modelling and SolidWorks modelling software. Impeller was modelled using Vista CPD Design to model impeller blades from 1D to 3D geometry.

In this study based on recommended number of impeller, in this study six blades impellers were chosen. In this study Complex 3-D Computational Fluid Dynamics analysis was performed to get the pressure distribution of the impellers by using ANSYS 19.0 software. ANSYS CFX was used to perform steady state CFD analysis of the three-stage centrifugal pump. One-way partitioned FSI analysis was used to determine the stress of the

three-stage pump where the fluid pressure on the structure will be transferred to the solid solver. The fluid flow is modelled as incompressible flow using water as a working fluid. k-SST omega turbulence model was used by considering wall of solid is modelled as no-slip condition. The principles of conservation law governed by fluid dynamics are[15]:

$$\frac{\partial u_i}{\partial x_i} = 0 \qquad \ldots 1$$

$$\rho\left(\frac{\partial u_i}{\partial t} + u_j \frac{\partial u_i}{\partial x_j}\right) = -\frac{\partial p}{\partial x_j} + \frac{\partial}{\partial x_j}\left(\mu \frac{\partial u_i}{\partial x_j} - \overline{\rho \acute{u}_i \acute{u}_j}\right) \qquad \ldots 2$$

Where u_i is velocity vector, p is pressure scalar, ρ is density, i and j is tension notations, $\overline{\rho \acute{u}_i \acute{u}_j}$ is apparent stress turbulence tensor, μ is the dynamic viscosity. The k–ω based SST model accounts for transport of turbulence shear stress and highly accurate prediction of the onset of the amount flow separation under adverse pressure gradients. The unknown turbulent viscosity μ_t is determined by solving two additional transport equations for turbulent energy k and for the turbulence frequency ω. These two equations can be written as:

$$\frac{\partial(\rho\kappa)}{\partial t} + \frac{\partial}{\partial x_j}(\rho k u_j) = \frac{\partial}{\partial x_j}[(\mu + \frac{\mu_t}{\sigma_k})\frac{\partial k}{\partial x_j}] + p_k - \beta'_{\rho k\omega} + p_k b \qquad \ldots 3$$

$$\frac{\partial(\rho\omega)}{\partial t} + \frac{\partial}{\partial x_j}(\rho\omega . u_j) = \frac{\partial}{\partial x_j}[(\mu + \frac{\mu_t}{\sigma_\omega})\frac{\partial \omega}{\partial x_j}] + \alpha \frac{\omega}{\kappa} p_k - \beta_{\rho\omega^2} + p_k b \qquad \ldots 4$$

The impeller is modelled in the blade frame, and the diffuser and return guide vane is in the fixed frame of the reference and both of them are related each other through the frozen rotor. The boundary conditions given in Table 1 were applied:

Table 1: CFD simulation boundary conditions
Boundary condition Value

Working fluid	Water
Temperature	25°C
Inlet pressure	0.3 bar
Speed	1480 rpm
Turbulence intensity	5%
Discharge flow rate	73.2 kg/s, 122 kg/s, 170.8 kg/s
Turbulence model	κ–ω SST

To simulate the pump under different flow rate operating conditions, the outlet mass flow rate was set to flow rates 0.6 Qd = 73.2 kg/s, Qd = 122 kg/s and 1.4 Qd = 170.8 kg/s design flow rate. Three dimensional incompressible Navier Stokes equations were solved with ANSYS 19.0-CFX Solver. In addition, a no-slip flow condition is applied on the walls (on the blade, hub and shroud). Smooth wall function was selected.

Unstructured meshes in CFX meshing was used to reduce the amount of time spent generating meshes, simplifying the geometry modeling and mesh generation process. Apart from its higher memory requirement unstructured mesh is also preferable for complex geometry. In this study uvnstructured mesh tetrahedral cells were used because the fluid domain in the pump has complex geometry. The geometry and the mesh of a six bladed pump impeller and diffuser with return guide vane domain were generated with CFX meshing as shown in Figure 1(a)-(d). Un- structured meshes with tetrahedral cells were used for the domain of impeller and diffuser with return guide vane as well as for the inlet and out-let casing of fluid domain.

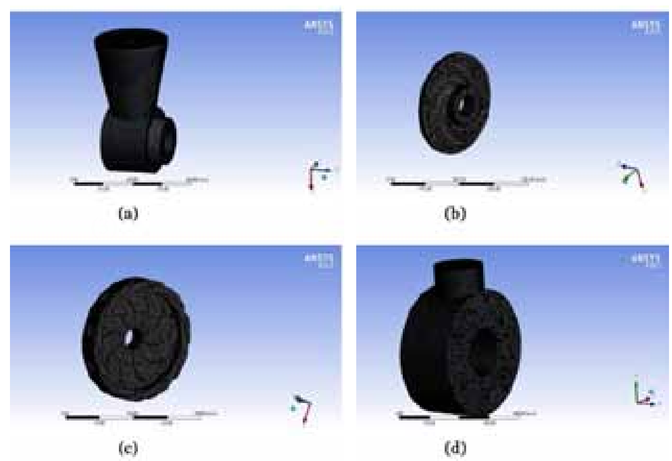

Figure 1: *CFD Fluid domain mesh*

To assure accuracy of simulation mesh independence in the flow domain must be determined before starting the CFD studies. In this study, the calculation domain was divided into unstructured grids by CFX Meshing. Seven mesh element size with the same numerical settings were analyzed to select appropriate mesh number of elements to carry out the CFD analysis of three stage centrifugal pump. As it can be observed from Figure 2 grid size minimally influences the numerical results, and the overall difference is within 1%. So, for the analysis of the three-stage centrifugal pump 2 353 607 elements were selected considering time and computational cost.

For centrifugal pump impeller the following materials was selected. Pump impeller operates

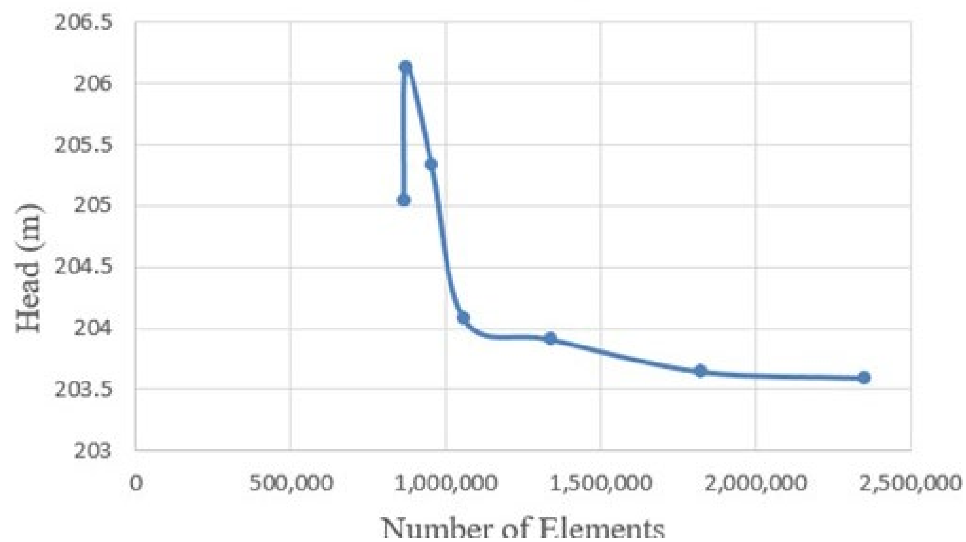

***Figure 2:** Mesh independency test*

in corrosive environment. The three selected material for impeller stress analysis are G-Cu-Sn10 Copper Tin Alloy, EN-GJL-250 Grey Cast Iron and G-X6CrNiMo18-10 stain- less steel.

3. Discussion of results

With the aid of CFD, the complex internal flow in the three stage centrifugal pump was predicted quite well. In this study, a steady state solution with κ-ω SST turbulence model was used in ANSYS-CFX for analysis of three stage centrifugal pump CFD simulation. From the manufacturers experience pumps may operate other than BEP of the pump which operates at nominal operating conditions. In this study the analysis of three stage centrifugal pump at off design condition was carried out at different flow rates 60% Qd, Qd and 140% Qd design flow rate. The analysis of the three-stage pump at different flow rate was carried out to see the impact of different flow condition on stress performance of an impellers. The CFD simulation result of the pump is shown in Figure 3.

The total head of the pump at the design flow rate of 439.2 m^3/hr obtained from the CFD analysis of the three-stage pump is 203.597 m. The head rise obtained through CFD analysis was over predicted the head rise than the design head of the pump which was 191 m. The over prediction of the CFD result is because leakage was not considered due to its computational cost and complexity in CFD simulation, additionally surface roughness of impeller, diffuser with return guide vanes was assumed to be smooth which in turn increases head of CFD when neglected. Figure 3 shows CFX simulation result of flow rate versus head. As it can be observed from Figure 3 as the flow rate increases the head of the pump decreases and vice versa.

3.1 Pressure distribution

From CFD simulation of the pump pressure distribution of the pump was obtained. Total pressure on pressure side of the blade is more than that of suction side. The difference of pressure from the pressure side to the suction side of the impeller blade is increasing from leading edge to trailing edge of the blade. The total pressure patterns are varying along the span of the impeller. Low total pressures are observed near hub of the impeller. Figure 4 shows pressure distribution of the CFD simulation of the pump at design flow rate Qd = 439.2 m^3/h. The pressure rise increases from the first stage impeller to the subsequent stage impellers of the pump.

As it can be observed from Figure 4(a), the maximum total pressure for the first stage impeller at design flow rate (Qd) is 0.6962 MPa and the minimum total pressure is -0.181 MPa. Similarly, as it is shown in the Figure 4(b) and (c) maximum pressure of second and third stage impeller is 1.330 MPa and 1.916 MPa respectively while minimum total pressure is 0.5127 MPa and 1.150 MPa. As it is indicated in Table 2, for 0.6Qd flow rate the maximum total pressure for the first stage impeller is 0.7633 MPa and the minimum total pressure is -0.09933 MPa. Similarly, the maximum pressure of second and third stage are 1.386 MPa and 1.973 MPa respectively while the minimum total pressure of second and third stage is 0.5365 MPa and 1.155 MPa respectively.

For 1.4Qd flow rate (Table 2), the maximum total pressure for the first stage impeller is 0.6686 MPa and the minimum total pressure is -0.1267 MPa. Similarly, the maximum pressure of the second and third stage impellers are 1.261 MPa and 1.794 MPa respectively, while the minimum total pressure of second and third stage is 0.5154 MPa and 1.096 MPa respectively. Generally, as


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Vande Bharat Express Flagging Off - 30th Dec. '23

Vande Bharat Express between Coimbatore & Bengaluru Cantonment was flagged off by our Prime Minister Shri Narendra Modi through Video Conferencing. President Sri. D. Vignesh attended the function.

Meeting with NABL QCI on 12th January 2024

Meeting was arranged at SIEMA with NABL QCI. Immediate Past President Sri. K.V. Karthik, Technical Committee Chairman Dr C. Murugesan, Dr. K. Ulaganathan - Director Si'Tarc & Mr. A.M. Selvaraj - Jt Director Si'Tarc had discussion with Mr. K. Soundirapandian, Deputy Director & Mr. Srikanth. R, Director of NABL.

IPMA EC Meeting on 19th January 2024

President Sri. D. Vignesh along with IPMA President Sri. K.V. Karthik, Past President Sri. V. Krishna Kumar attended the IPMA EC Meeting held at Franklin Electric - Pluga Factory at Vadodara

Industrial Visit to Superteck Industries on 23rd January 2024

An industrial visit was also organised by SIEMA and IPMA for the participants of the meeting to M/s Superteck Industries at Arasur. During the Visit our Vice President Sri. Ma.Senthil Kumar, briefed about the activities of the company to all the participants. All the participants appreciated and thanked for the industrial visit on 23rd January 2024.

it can be observed from Table 2, at different flow rates of the pump, the pressure of the fluid increases as the fluid flows from the suction side to the discharge side at each stage of the pump. In all operating conditions, the global maximum pressure was observed at the third stage impeller. Additionally, the pressure of the pump decreases as the flow rate of the pump increases and vice versa.

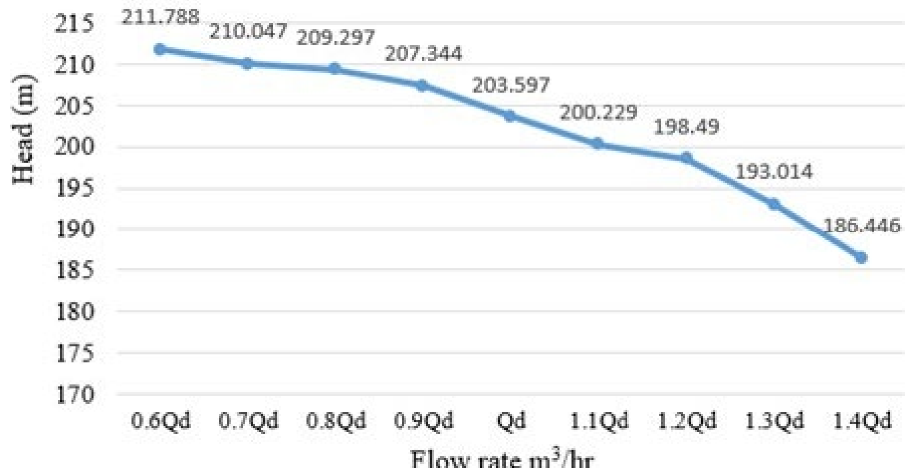

Figure 3: *Flow rates versus head*

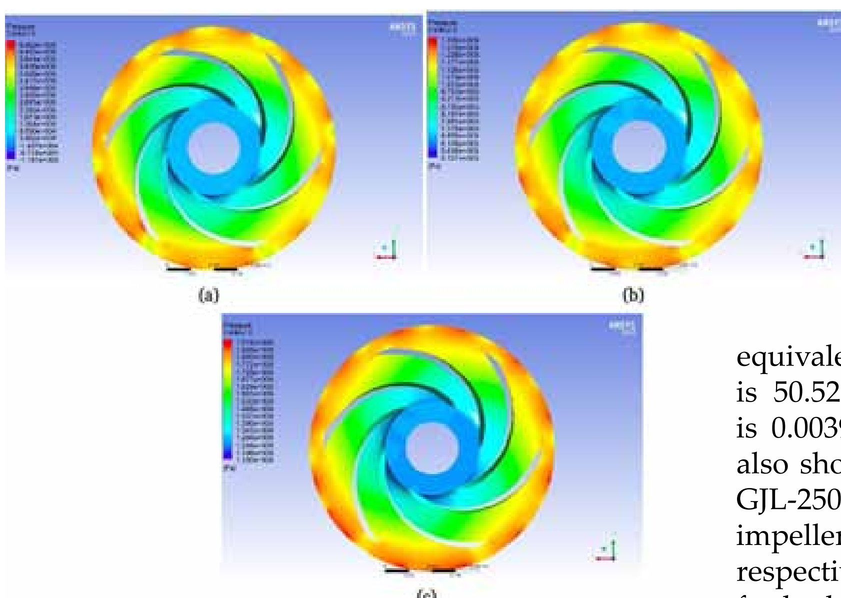

Figure 4: *Pressure distribution in impeller (a) Stage I (b) Stage II (c) Stage III*

Table 2. Pressure distribution

Flow Rate (m^3/hr)	Pressure distribution (MPa)					
	Stage I		Stage II		Stage III	
	Max	Min	Max	Min	Max	Min
0.6Qd	0.7633	-0.099331	1.386	0.5365	1.973	1.155
Qd	0.6962	-0.1181	1.330	0.5127	1.916	1.150
1.4Qd	0.6686	-0.1267	1.261	0.5154	1.794	1.096

3.2 FSI stress analysis in the impeller

Numerical stress analysis of the impellers of the three-stage centrifugal water pump was performed. The pressure distribution on the surface of the impeller was imported to FEA module to perform FSI stress analysis of the impeller at 0.6Qd, Qd and 1.4Qd flow rates of the pump operation. In this study, factor of safety was analyzed only for the third stage impeller because the third stage impeller experiences maximum pressure in all flow rate conditions which leads to higher stress and deformation.

3.2.1 FSI stress analysis at 0.6Qd flow rate: FSI stress analysis was analyzed at 0.6Qd flow rate of the pump operation for three different materials. In the first stage impeller, maximum equivalent stress for G-Cu-Sn10 Copper Tin Alloy is 50.521 MPa and minimum equivalent stress is 0.00399 MPa (Table 3). The data in the table also shows that FSI stress analysis result for EN-GJL-250 Grey Cast Iron and G- X6CrNiMo18-10 impeller materials is 49.676 MPa and 50.057 MPa respectively. Similarly minimum equivalent stress for both material is 0.0044873 MPa and 0.0052831 MPa.

As the pressure of water increases from first stage to the second stage, it is expected that equivalent stress of the second stage increases. As it can be observed from Table 2, the maximum equivalent stress of the second stage impeller of the pump is for G-Cu-Sn10 Copper Tin Alloy is 110.61 MPa and minimum equivalent stress is 0.094794 MPa. Similarly maximum equivalent stress of the second stage impeller for EN-GJL-250 Grey Cast Iron and G-X6CrNiMo18-10 is 108.33 MPa and 109.36 MPa respectively. Additionally, minimum equivalent stress for both materials are 0.083661 MPa and 0.0720061 MPa respectively.

Generally, as it can be observed that the stress in the impeller increases from the first stage to the third stage because as the number of stages of the impeller increases, the pressure of the water rises which results in high pressure on the surface of

Table 3: FSI equivalent stress of impeller at 0.6Qd

Materials	Equivalent Stress (MPa)					
	Stage I		Stage II		Stage III	
	Max	Min	Max	Min	Max	Min
G-Cu-Sn10 Copper Tin Alloy	50.521	0.00399	110.61	0.094794	171.32	0.10044
EN-GJL-250 Grey Cast Iron	49.676	0.0044873	108.33	0.083661	167.72	0.12008
G-X6CrNiMo18-10	50.057	0.0052831	109.36	0.0720061	169.4	0.088268

the impeller as the pump stage increases. It can be concluded that the third stage impeller is critical impeller as it experiences high stress.

3.2.2 FSI stress analysis at Qd flow rate: This section discusses results of FSI stress analysis in the impeller at design flow rate operation of the pump. Like previous case, FSI stress analysis was performed for three different materials of the impeller. Results obtained from the analysis are illustrated in Figure 5 and summarized in Table 4. As it is shown in the table, for first stage impeller, maximum equivalent stress for G-Cu-Sn10 Copper Tin Alloy is 50.802 MPa and minimum equivalent stress is 0.018 MPa. Similarly, maximum equivalent stress of the first stage impeller for EN-GJL-250 Grey Cast Iron and G- X6CrNiMo18-10 is 48.1 MPa and 48.51 MPa respectively. Additionally, minimum equivalent stress for both materials is 0.025 MPa and 0.013 MPa. From second stage impeller, FSI stress analysis for G-Cu- Sn10 Copper Tin Alloy maximum equivalent stress is 108.98 MPa while minimum equivalent stress is 0.128. Similarly, as it is shown in Table 4, maximum equivalent stress of the second stage impeller for EN- GJL-250 Grey Cast Iron and G-X6CrNiMo18-10 is 105.93 MPa and 107.05 MPa respectively.

Also, minimum equivalent stress for both material is 0.094 MPa and 0.115 MPa respectively. Compared to first stage impeller, the equivalent stress for the three materials has been increased. In the case of third stage impeller FSI stress analysis, equivalent stress increased for all the three materials as compared to the first and second stage impeller. As it can be observed from Table 4, the maximum equivalent stress of the third stage impeller of the pump for G-Cu-Sn10 Copper Tin Alloy is 166.96 MPa and minimum equivalent stress is 0.087 MPa. Similarly maximum equivalent stress of the third stage impeller for EN-GJL-250 Grey Cast Iron and G-X6CrNiMo18-10 is 161.34 MPa and 163.05 MPa respectively. Additionally, minimum equivalent stresses for both materials are 0.12671 MPa and 0.10297 MPa respectively. Generally, the stress in the impeller increases from the first stage to the third stage because the pressure of the water rises as the pump stage increases, which results in high pressure on the surface of the impeller.

3.2.3 FSI impeller equivalent stress at1.4Qd flow rate: The FSI stress analysis results for three stage impeller is presented in Table 5. As shown, maximum equivalent stress of the first stage impeller of the pump for G-Cu-Sn10 Copper Tin Alloy is 49.251 MPa and minimum equivalent stress is 0.012 MPa. Similarly maximum equivalent stress of the first stage impeller for EN-GJL-250 Grey Cast Iron and G-X6CrNiMo18-10 stainless steel are 48.366 MPa and 48.764 MPa respectively. Also, the minimum equivalent stress for both materials are 0.0174 MPa and 0.020 MPa respectively.

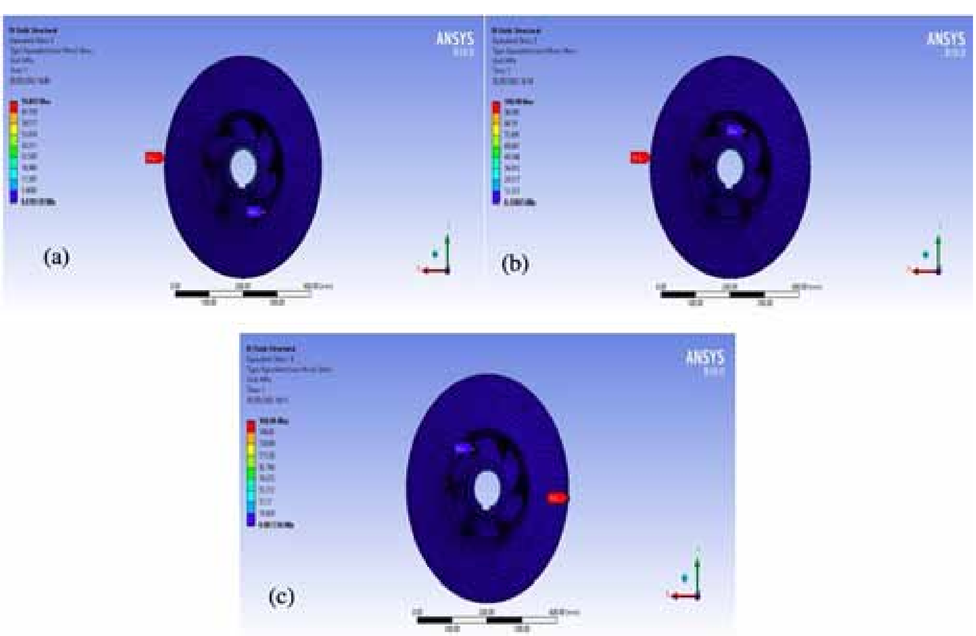

Figure 5: *Equivalent stress for G-Cu-Sn10 Qd flow rate (a) Stage I (b) Stage II (c) Stage III*

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Visit to Si'Tarc on 23rd January 2024

After the Industrial Visit to SUPERTECK INDUSTRIES, the Industrial Visit participants also visited Sitarc and learned about the activities and services at SiTarc.




Felicitation Event for Coimbatore Police Commissioner on 24th January, 2024

SIEMA with CII, CODISSIA, CHAMBER & RAAC arranged for a felicitation event for the Coimbatore Commissioner on the evening of January 24th at CODISSIA Trade Fair Complex. Our President Sri. D. Vignesh addressed the meeting.



Table 4: FSI equivalent stress of impeller at Qd flow rate

Materials	Equivalent Stress (MPa)					
	Stage I		Stage II		Stage III	
	Max	Min	Max	Min	Max	Min
G-Cu-Sn10 Copper Tin Alloy	50.802	0.018	108.98	0.128	166.96	0.087
EN-GJL-250 Grey Cast Iron	48.097	0.025	105.93	0.094	161.34	0.127
G-X6CrNiMo18-10	48.509	0.013	107.05	0.115	163.05	0.103

On the other hand, the equivalent stress in the second stage impeller for G-Cu-Sn10 Copper Tin Alloy is 103.96 MPa and minimum equivalent stress is 0.096 MPa. Similarly, as it can be observed from Table 5 that maximum equivalent stresses of the second stage impeller for EN-GJL-250 Grey Cast Iron and G-X6CrNiMo18-10 are 101.78 MPa and 102.78 MPa respectively. Additionally, minimum equivalent stresses for both materials are 0.0476 MPa and 0.092 MPa.

At 1.4Qd flow rate operation of the pump, the equivalent stress at third stage is greater than that of the first two stage impellers. As it can be observed from Table 5, maximum equivalent stress of third stage impeller of the pump for G-Cu-Sn10 Copper Tin Alloy is 154.68 MPa and minimum equivalent stress is 0.094 MPa. Similarly, as it indicated in Table 4.20 maxi- mum equivalent stress of the third stage impeller for EN-GJL-250 Grey Cast Iron and G- X6CrNiMo18-10 is 151.21 MPa and 152.86 MPa respectively. Also minimum equivalent stress for both material is 0.122 MPa and 0.076 MPa. Generally, the stress of the impeller increases from the first stage to the third stage because of the fact that as the stage of the impeller increases the pressure of the water rise which results in high pressure on the surface of the impeller as the pump stage increases.

The study shows that in all operating conditions of the pump minimum stress was observed near the hub on the suction side of the pump. Research indicated that in centrifugal pump impellers, the minimum pressure exists at the suction side of the impeller. The lowest result of pressure at the suction side of the impeller results in the lowest equivalent stress value at the suction side of the impeller. As it can be observed from the above stress analysis of the impeller at all flow rate conditions i.e at 60% Qd, Qd and 1.4 Qd flow rate the maximum equivalent stress was observed on the pressure side at the trailing edge of the pump. The result agrees with previous research conducted [16].

Table 5: FSI equivalent stress of impeller at 1.4 Qd flow rate

Materials	Equivalent stress (MPa)					
	Stage I		Stage II		Stage III	
	Max	Min	Max	Min	Max	Min
G-Cu-Sn10 Copper Tin Alloy	49.251	0.012	103.96	0.095	154.68	0.094
EN-GJL-250 Grey Cast Iron	48.366	0.017	101.78	0.048	151.21	0.122
G-X6CrNiMo18-10	48.764	0.020	102.78	0.091	152.86	0.076

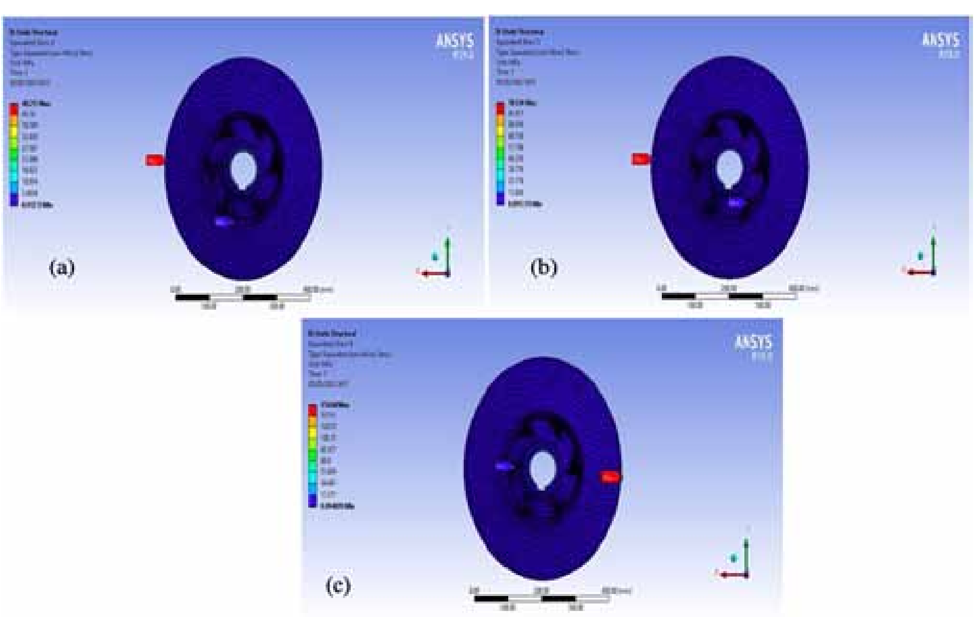


***Figure 6:** Equivalent stress for G-Cu-Sn10 Qd flow rate (a) Stage I (b) Stage II (c) Stage III*

3.3 FSI Total deformation of impeller

3.3.1 FSI Total deformation of impeller at 0.6Qd flow rate:

From FSI stress analysis of impeller total deformation of impeller at different stages of the pump was carried out. In this study total deformation analysis was carried out only for the third impeller because third stage impeller experiences high pressure and stress. Maximum total deformation of third stage impeller of the pump for G-Cu-Sn10 Copper Tin Alloy is 1.4609 mm and minimum

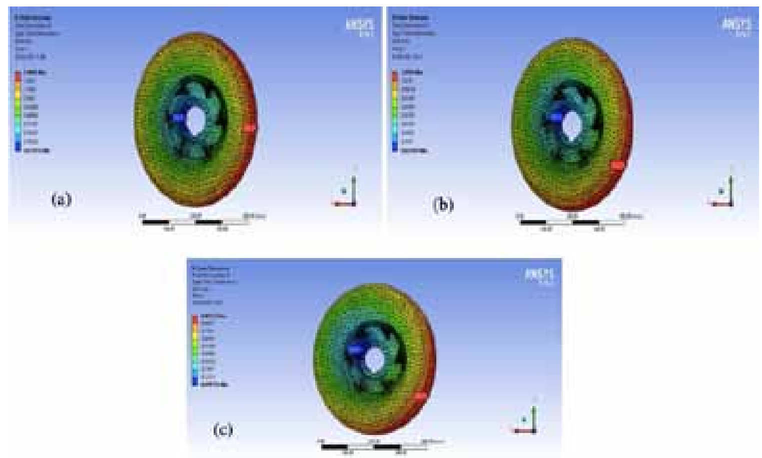


***Figure 7:** Total deformation for G-Cu-Sn10 impeller material at (a) 0.6Qd flow rate, (b) Qd flow rate and (c) 1.4Qd flow rate*

Table 6. FSI Equivalent stress of impeller at 0.6Qd, Qd and 1.4Qd flow rate

Materials	Total deformation (mm)					
	0.6Qd		Qd		1.4Qd	
	Max	Min	Max	Min	Max	Min
G-Cu-Sn10 Copper Tin Alloy	1.4609	0.037053	1.2056	0.020185	1.4661	0.037053
EN-GJL-250 Grey Cast Iron	1.5	0.035975	1.2556	0.021183	1.5	0.019502
G-X6CrNiMo18-10	1.3959	0.038336	1.2065	0.020871	1.4425	0.01894

total deformation is 0.037053 mm. Similarly total deformation of the third stage impeller for EN-GJL- 250 Grey Cast Iron and G-X6CrNiMo18-10 is 1.5 mm and 1.3959 mm respectively. Additionally, minimum deformation for both material is 0.035975 mm and 0.038336 mm.

3.3.2 FSI Impeller total deformation at Qd flow rate:

As it can be observed from Table 3 above the maximum total deformation of third stage impeller of the pump for G-Cu-Sn10 Copper Tin Alloy is 1.2056 mm and minimum total deformation is 0.020185 mm. Similarly, from Table 4.19 total deformation of the third stage impeller for EN-GJL-250 Grey Cast Iron and G-X6CrNiMo18-10 Stain- less steel is 1.2556 mm and 1.2065 mm respectively. Additionally, minimum total deformation for both material is 0.021183 mm and 0.020871 mm respectively.

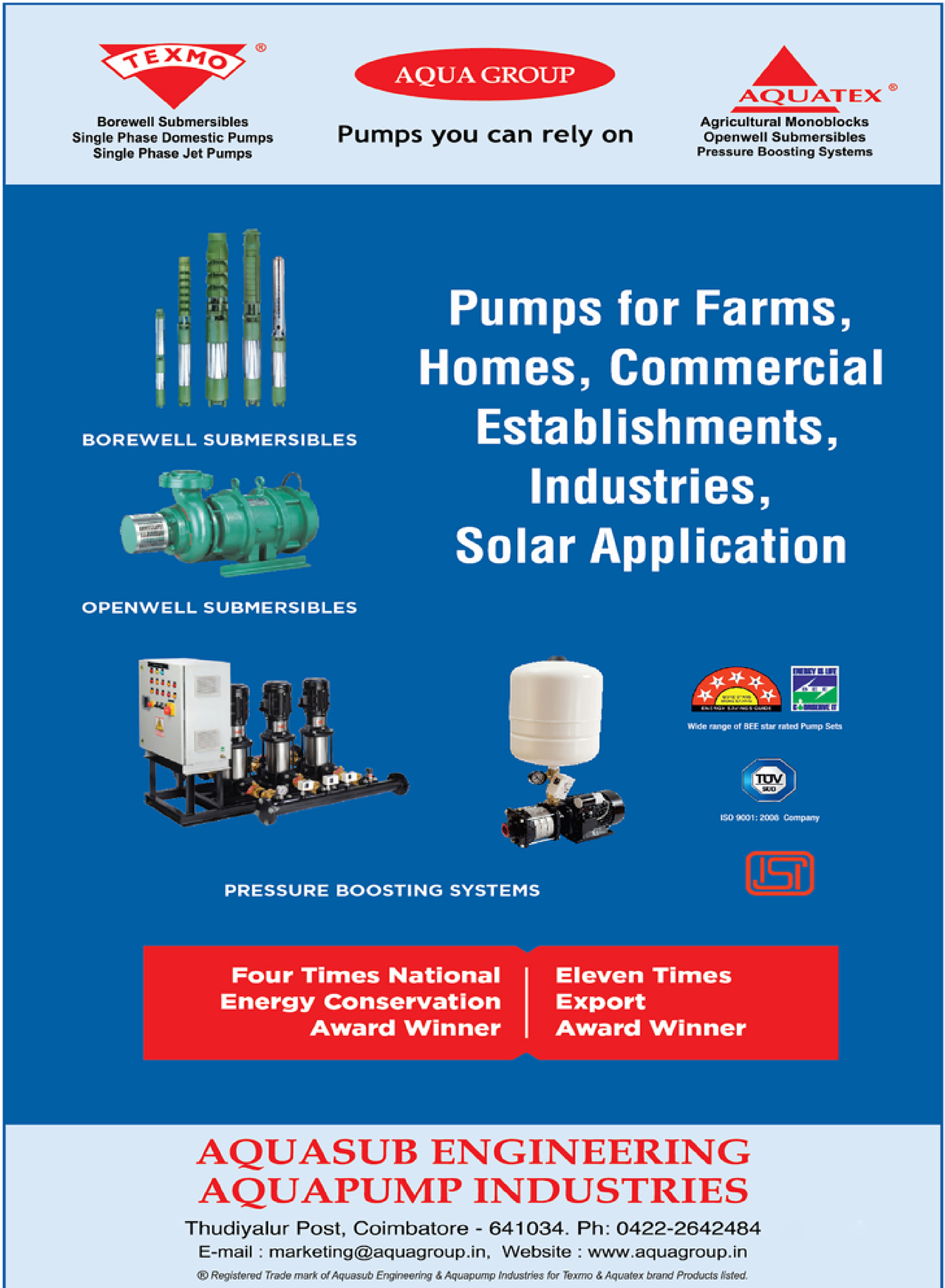
3.3.3 FSI impeller total deformation at 1.4Qd flow rate

Total deformation of the third stage impeller at 1.4Qd flow rate of the pump discussed. Results obtained from total deformation is presented in Table 3 above. As it can be observed from the Figure 7 maximum total deformation of third stage impeller of the pump is for G-Cu-Sn10 Copper Tin Alloy is 1.46609 mm and minimum deformation is 0.037053 mm. Similarly total deformation of the third stage impeller for EN-GJL-250 Grey Cast Iron and G- X6CrNiMo18-10 is 1.5 mm and 1.4425 mm respectively. Also, minimum total deformation for both material is 0.019502 mm and 0.01894 mm. In all cases of the operating conditions of the pump maximum impeller deformation was observed at the trailing edge of the impellers in all the three materials of the pump. This is due to the fact that the pressure inside the impeller increases from the leading edge of the pump to the trailing edge of the pump hence it creates high stress and deformation at the trailing edge of the impeller of the pump.

3.4 FSI safety factor of impeller at different flow rate:

Stage III FSI safety factor at 0.6Qd flow rate: In this study, the safety factors were analysed only for the third stage impeller. This is due to the fact that the impellers have the same geometry, and from the three impellers arranged in series on the shaft, the third stage impeller experiences high stress and deformation. As it can be observed from Figure 8(a), the safety factor at 0.6Qd flow rate of the pump for G-Cu- Sn10 Copper Tin Alloy is around 0.76, while for EN-GJL- 250 Grey Cast Iron and G-X6CrNiMo18-10, the safety factors 0.98 and 1.24 respectively. Factor of safety for G-Cu-Sn10 Copper Tin Alloy and EN- GJL-250 Grey Cast Iron is less than one which means the impeller fail before design life of the impeller. Factor of safety for G-X6CrNiMo18-10 is 1.24 which indicates that the impeller is safe because the safety factor is greater than one.

Stage III FSI safety factor at Qd flow rate: As it can be observed from the Figure 8(b), the safety factor for G- Cu-Sn10 Copper Tin Alloy is around 0.78, while for EN- GJL-250 Grey Cast Iron and G- X6CrNiMo18-10 the safety factors are 1.02 and 1.3 respectively. Factor of safety for G-Cu-Sn10 Cop- per Tin Alloy is less than one, which means the impeller fails before its design life. The safety factor for G-X6CrNiMo18-10 is 1.29 which is also greater than one implying that the impeller is safe.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MED 20 Sectional Committee along with MED20.5 and MED 20.6 on 24th January, 2024

MED 20 Sectional Committee along with MED20.5 and MED 20.6 was conducted at SIEMA board room on 24th January 2024 . Our President Vignesh along with IPMA president K.V. Karthik welcomed the participants. The meeting was chaired by Shri Abdul Rahiman from CWPRS instead of Shri A. K. Nijhawan chairman MED 20. Dr.C. Murugesan our TC Chairman, Convenor MED 20.5 and Dr.R Birajdar VP - Design KBL Convenor MED20.6 convened the meeting along with Mr. Aman Dhanawat Member secretary.

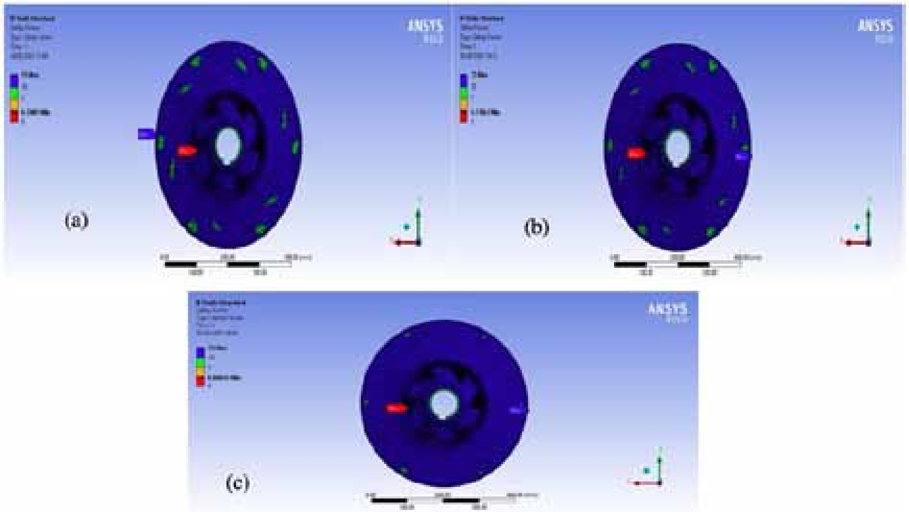

Figure 8: *Stage III safety factor for G-Cu-Sn10 impeller material at (a) 0.6Qd flow rate, (b) Qd flow rate and (c) 1.4Qd flow rate*

Stage III FSI safety factor at 1.4Qd flow rate: Plot of the safety factor distribution for this case is given in Figure 8(c), where it is observed that the value for G- Cu-Sn10 Copper Tin Alloy is 0.76. For EN- GJL-250 Grey Cast Iron and G-X6CrNiMo18-10, the minimum safety factor values are 0.98 and 1.24 respectively. It indicates that the safety factor for G-Cu-Sn10 Copper Tin Alloy and EN-GJL-250 Grey Cast Iron are less than one, which means the impeller fails before its design life. On the other hand, the G-X6CrNiMo18-10 material is safe because its safety factor is 1.24 which is greater than one.

4. Conclusion

To investigate the effect of the fluid pressure on centrifugal water pump impeller, CFD analysis of a three-stage centrifugal pump was carried out using ANSYSS CFX at different flow rates of the pump ranging from 0.6Qd to 1.4Qd flow rates. In the analysis, a steady state solution with k- SST turbulence model was used in ANSYS-CFX for analysis of the centrifugal water pump. The result shows that as the flow rate increases the head of the pump decreases and as the flow rate of the pump decreases the head developed by the pump increases. The head rise obtained through CFD analysis was over predicted head rise than the design head of the pump which was 191 m. This is due to the fact that leakage was neglected in the analysis of the pump during the analysis and also surface roughness of the impeller, diffuser with return guide vanes was assumed to be smooth.

Numerical stress analysis of the impellers of the three-stage centrifugal water pump was performed, in which it was observed that the pressure distribution on the surface of the impeller varied from suction side to the pressure side of the impeller. The pressure of the fluid does not only vary along the surface of the impeller but also it varies along different stages of the pump. From the finding of the study, the third stage experiences higher deformation and stress than the first and the second stage impeller. The results obtained from the impeller analysis shows that the impeller stress increases as the flow rate decreases because the pressure acting on the wall of the impeller increases as the pump flow rate decreases.

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உங்களுக்கு தெரியுமா?

கழுதைக்கு தெரியுமா கற்பூர வாசனை.

பொருள்:

கழுதைக்கு கற்பூர வாசம் தெரியாது.

உண்மையான பழமொழி

கழு தைக்க தெரியுமாம் கற்பூர வாசனை.

பொருள்:

கழு என்பது ஒரு வகை கோரைப்புல். அதில் பாய் தைத்து படுத்து பார்த்தால் கற்பூர வாசனை தெரியும் என்பதே சரியான விளக்கம்.

பதினாறும் பெற்று பெருவாழ்வு வாழ்க!

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மணமான பின், பதினாறு குழந்தைகளை பெற்று வளமான வாழ்க்கை வாழ வேண்டும் என ஆசீர்வாதம் செய்வார்கள்.

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ரூட்ஸ் நிறுவனங்கள், கோவை

'செயல்பாடில்லாத அறிவோ பயனற்றது, பொருத்தமற்றது. செயல்பாடுடன் கூடிய அறிவோ நல்வளத்தைப் பெருக்குவது' என்றார் ஏ.பி.ஜெ.அப்துல்கலாம். ஆம்! அறிவுவளத்தை பெருக்கிக் கொண்டே இருக்க வேண்டும். ஏனென்றால் ஒருவருடைய அறிவு வளமே அவருடைய வளர்ச்சிக்கும் முன்னேற்றத்திற்கும் மூலதனமாக அமைகிறது. மேலும், உலகில் நிகழும் விஞ்ஞானம் மற்றும் தொழில் நுட்ப வளர்ச்சி வாழ்க்கையை மிகவும் சிக்கல் நிறைந்ததாக மாற்றி வருகிறது என்றால் அது மிகையல்ல. அவ்வாறான மாற்றங்களால் மனிதனுடைய பழக்க வழக்கங்கள், உணவு முறைகள் போன்றவற்றுடன் உணர்வு நிலையிலும் அதிசயதக்க மாற்றங்களை தொடர்ந்து ஏற்படுத்திக் கொண்டே இருக்கிறது.

அவ்வாறான மாற்றங்களுக்கு ஈடு கொடுத்து உயர்வதற்குத் தேவையான உயர்வான அறிவுவளம் (Updated Knowledge) தேவைப்படுகிறது. மறைவாக பழங்கதைகளைப் பேசிக் கொண்டு விஞ்ஞானயுகத்தைக் கடக்க முடியாது.

விஞ்ஞானத்தையும் தொழில்நுட்ப மாற்றங்களையும் உள்வாங்கிக் கொண்டு தொடர்ந்து வெற்றிப் பாதையில் செல்வதற்கு காலத்திற்கேற்ற அறிவைப் பெருக்கிக் கொள்ள வேண்டும்.

விஞ்ஞானத்தையும் தொழில்நுட்ப மாற்றங்களையும் உள்வாங்கிக் கொண்டு தொடர்ந்து வெற்றிப் பாதையில் செல்வதற்கு காலத்திற்கேற்ற அறிவைப் பெருக்கிக் கொள்ள வேண்டும்.

அறிவுவளத்தை பெருக்குவதற்கு 'ROLE-T' என்ற முறையைக் கடைபிடித்து பலன்பெறலாம். அதாவது R - Reading *(கற்றல்)*, O - Observation *(கவனித்தல்)*, L - Listening *(கேட்டல்)*, E - Experiencing *(அனுபவப்படுதல்)* நிறைவாக T - Thinking என்று கொள்ளலாம். கற்றது காலத்திற்கும் உதவும்; கல்லாதது காலத்திற்கும் துன்பம் விளைவிக்கும் என்பது நடைமுறை வாழ்வின் நிதர்சனம். ஆகவே வாசிப்பதற்கு நேரம் ஒதுக்கிக் கொள்ளுங்கள், அது உங்களுடைய அறிவு வளத்தைப் பெருக்க உதவும். அதன் மூலமாக உங்களுடைய சிந்தையில் புதுமைகள் பூத்துக் குலுங்கும். முடியாதது என்றிருந்ததையும் முடிக்கும் வல்லமை முயற்சியில் தோன்றும்.

வாசித்தல் (Reading)

வாசிப்பை சுவாசிப்பாக்கிக் கொள்கிறவர்கள், தொடர்ந்து அறிவுத் திறனை மேம்படுத்திக் கொண்டே இருக்கிறார்கள். தொழில் சார்ந்த வாசிப்பு, சமுதாயம் சார்ந்த வாசிப்பு, தன்னம்பிக்கையும் ஊக்குவிப்பும் சார்ந்த வாசிப்பு என்பன போன்ற பல்வேறு துறை சார்ந்த வாசிப்புகளை மேற்கொண்டு அந்தந்த துறை சார்ந்த அறிவை வளப்படுத்தி கொள்ளலாம்.

வாசிப்பதற்கு நேரமில்லை எனக் கூறுவதைவிட, ஆர்வமில்லை என்பதே உண்மையானதாகும். வாசிக்கும் ஆர்வம் இருந்தால் அதற்கான நேரத்தை உருவாக்கிக் கொள்ள முடியும். நாம் எதை நேசிக்கிறோமோ அதற்கான நேரத்தையும் ஈடுபாட்டையும் உருவாக்கிக் கொள்ளமுடியும். ஆகவே, வாசிப்பதற்கும் அதன்மூலம் அறிவை வளப்படுத்திக் கொள்வதும் வளர்ச்சிக்கு மிகவும் அவசியம்.

கவனித்தல் (Observation)

ஒவ்வொரு பொருளையும் நிகழ்வையும் கூர்ந்து கவனிப்பதன் மூலமாக நமது அறிவையும் புரிதலையும் தெளிவுபடுத்திக் கொள்ள முடியும். ஒன்றைப் பார்த்தல் என்பது வேறு; கவனித்தல் என்பது வேறு. பார்ப்பதை மனதில் இருத்திச் சிந்திப்பதே கவனித்தல். ஆப்பிள் பழம் மரத்தில் இருந்து கீழே விழுவதை எல்லோரும் பார்த்தார்கள், ஆனால் ஐசெக் நியுட்டன் கவனித்தார். ஆப்பிள் பழம் ஏன் மேலே செல்லாமல் கீழே விழுகிறது என்று சிந்தித்தார். அதன் விளைவாக புவியீர்ப்பு விசையைக் கண்டுபிடித்தார். இதுதான் பார்ப்பதற்கும் கவனிப்பதற்கும் உள்ள வேறுபாடு. நாம் பார்ப்பதை எல்லாம் கவனிப்பது இல்லை. ஆனால் எதைக் கவனிக்கிறோமோ அதிலே இருந்து கற்றுக் கொள்கிறோம். அவ்வாறு கற்றுக் கொள்ளும் போது நமது அறிவு விசாலமடைகிறது.

கேட்டல் (Listening)

செல்வத்துள் செல்வம் செவிச்செல்வம் அச்செல்வம்
செல்வத்துள் எல்லாம் தலை (411)

என்பது வள்ளுவர் வாக்கு. கற்றலை விட கேட்டல் சிறந்தது என்பதுதான் இதன் அர்த்தம். குறைவாகப் பேசி நிறைவாகக் கேட்க வேண்டும். வகுப்பறையில் கூர்ந்து கேட்கும் மாணவர்களே சிறந்த சிந்தனையாளர்களாக உருவாகி இருக்கிறார்கள். கேட்டதை எல்லாம் அப்படியே ஏற்றுக் கொள்ளாமல் அது குறித்து மீண்டும் மீண்டும் சிந்தித்துத் தெளிவு பெற வேண்டும்.

ஒவ்வொரு விசயம் குறித்தும் தெளிவு உண்டாகும்போது, எதையும் எளிதில் எதிர்கொள்ளும் திறனும் அவற்றை வெல்லும் ஆற்றலும் கூடுகிறது.

அனுபவப்படுதல் (Experiencing)

அனுபவமே சிறந்த ஆசான் என்பார்கள். வாசித்தல், கவனித்தல், கேட்டல் ஆகிய எல்லாவற்றையும் விடவும் அனுபவத்தின் மூலமே ஐயமின்றி கற்றுக் கொள்கிறோம். அனுபவ வயல்களில் விளைந்த கருத்துமணிகள், ஆயுள் முழுமைக்கும் நம்மை வழிநடத்தும் ஆற்றல் மிக்கவை. ஒவ்வொரு அனுபவத்திலிருந்தும் ஓராயிரம் பாடங்களைக் கற்றுக் கொள்கிறோம். மேலும் என்ன நிகழ்ந்தது என்பதல்ல அனுபவம், அதிலிருந்து என்ன கற்றுக் கொண்டோம் என்பதே அனுபவம்.

சிந்தனை செய்தல் (Thinking)

வாசித்தது, கவனித்தது, கற்றது, அனுபவப்பட்டது என பலவகையான தகவல்களையும் அவ்வாறே உண்மை என்று நம்பி ஏற்றுக் கொள்ளாமல், அவற்றை பகுத்தறிவுக்கு உட்படுத்தி பகுத்தாய்வு செய்து உண்மையை எதுவென உணர்ந்து அதனை உள்ளத்தில் பதிய வைத்துக் கொள்வது மிகவும் முக்கியம்.

எல்லாவற்றையும் நம்பிவிடாமலும், எல்லாவற்றையும் நம்பாமலும் இருந்து விடாமல் எதையும் சிந்தித்து உணர்ந்து கொள்வதின் மூலமாகவே நமது அறிவு தெளிவடைகிறது. அவ்வாறான தெளிந்த நல்லறிவே வெற்றிக்கு உரமாகவும் உந்து சக்தியாகவும் அமைகிறது.

பறவைகள் பறப்பதை அனைவரும் பார்த்தார்கள். ஆனால் ரைட் சகோதரர்கள், ''நாம் ஏன் பறவைகளைப் போல பறக்க கூடாது? என்று சிந்திக்கத் தொடங்கினார்கள். அதன் விளைவாக ஆகாய விமானத்தைக் கண்டு பிடித்தார்கள். அதுபோல நாம் ஒவ்வொரு நிகழ்வையும் உற்று நோக்கி ஆழமாக சிந்தித்தால் அறிவுவளம் பெருகும்; புதியன நிகழும்.

Republic Day Celebrations - Sitarc, Avarampalayam – 26th January, 2024

6th MC Meeting of SIEMA – 26th January, 2024

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Flowers

Flowers are not just beautiful; they are essential to our environment, culture, and well-being. Their vibrant colors and fragrant scents bring joy to our lives and inspire creativity in art and literature. Flowers serve as messengers of emotions and play a vital role in the pollination of food crops.

Flowers are a testament to the beauty and wonder of nature. Let us see the significance of flowers, exploring their role in our lives, their impact on the environment, and the joy they bring to people around the world.

Flowers have always held a special place in human culture. Their enchanting beauty has inspired artists, poets, and writers for centuries. From the romantic red rose to the cheerful sunflower, flowers come in an astonishing array of shapes and colors.

Flowers play a crucial role in our ecosystem. They are pollinated by bees, butterflies, and other insects, helping to fertilize plants and produce fruits and vegetables. In fact, experts estimate that nearly 75% of the world's food crops depend on pollinators like bees.

Throughout history, flowers have been used to convey emotions and sentiments. The Victorian era saw the emergence of the "language of flowers," where specific flowers were given to express feelings. For example, a red rose symbolized love, while a white lily represented purity.

Furthermore, flowers possess medicinal properties. For instance, in certain cultures, flowers such as chamomile and lavender have been employed for their calming and curative attributes. Additionally, medical professionals recognize the advantages of these flowers in addressing health issues and facilitating relaxation.

Flowers are an integral part of cultural traditions around the world. Moreover, in India, the marigold is used in garlands for festivals and ceremonies. Similarly, in Japan, cherry blossoms mark the arrival of spring and are celebrated with Hanami, the viewing of cherry blossoms.

"Flowers are frequently linked to celebrations and special occasions; furthermore, statistics reveal that billions of dollars are expended each year on flowers for events such as weddings, birthdays, and anniversaries. Consequently, the inclusion of flowers imparts an element of sophistication and emotion to these moments.

Flowers contribute to a healthier planet. They absorb carbon dioxide and release oxygen, helping to improve air quality. Experts in environmental science emphasize the importance of maintaining biodiversity, which includes preserving diverse species of flowers.

Gardening with flowers is a popular hobby enjoyed by people of all ages. It provides relaxation, exercise, and the satisfaction of nurturing life. Horticulture experts highlight the therapeutic benefits of tending to flower gardens.

As we admire the petals and leaves of these botanical wonders, let us remember that they are not just symbols of beauty but also symbols of life, growth, and interconnectedness. Flowers, in all their splendor, remind us of the remarkable tapestry of nature and the importance of preserving it for generations to come.

They have been used for various purposes, including decoration, medicine, and in religious practices. Flowers aren't just pretty; they're super important in nature because they provide food and habitat for many animals and insects.

Recent research from Rutgers University in New Jersey has shown that the presence of flowers triggers positive emotions and feelings of life satisfaction. Everyone knows the joy of receiving flowers, but studies have shown those feelings last and have a long-term positive impact.

What the Media says?

TIMES CITY

2

20 MSMEs Are Set To Invest ₹670 Crore In The Sector In The District

Coimbatore on course to emerge as state's EV hub

Subburaj.A@timesgroup.com

Coimbatore's electric vehicle (EV) manufacturing sector is poised for a big leap in the coming days as more players are set to enter the sector while the existing players are planning to widen their product range.

As many as 20 MSMEs are set to invest about Rs 670 crore in the EV sector in Coimbatore. They have signed MoUs with the state government for the purpose at the recently concluded Global Investors Meet.

Another significant development is that research to manufacture motors for EVs is also set to begin soon.

So far, EV companies are importing motors from China while only components are made here.

Once motor manufacturing begins, the pump industry in the city would also benefit as they would be roped in to supply components for EV motors.

Of the 20 MSMEs who have signed MoUs, 10 are currently into the making of pump sets. They have decided to foray into EV manufacturing, considering the potential for growth in the sector.

Coimbatore collector Kranthi Kumar Pati told TOI that several MSMEs have expressed interest in EV manufacturing in the district.

"These industries plan to set up their units on Pollachi Road in Coimbatore district. We are extending all support to them to make Coimbatore a hub for EVs," Kranthi Kumar Pati said.

Industry insid-

... ed from China. The situation will change soon," says former president of Si'Tarc and founder of Superteck Industries, Ma... Sendil Kumar. Si'Tarc (Scientific and Industrial Testing and Research Centre) Coimbatore is going to start the ...

900-odd pump manufacturing units in Coimbatore, and once the R&D is successful, the pump manufacturers can make motors for electric vehicles in Coimbatore.

G Thirumurugan, general manager, District Industries ...

Pics: J Jackson

PACT INKED: The MSMES have signed MoUs with ...

NEW STRIDES

- Industries that have machinery worth ₹50 crore and a turnover of ₹250 crore are considered as MSMEs (micro, small and medium enterprises).
- As many as 1.63 lakh MSME units are registered under the Udyam Registration in Coimbatore district
- Of the 1.63 lakh MSME units, 96 % are micro-industrial units only.
- Pump, wet grinders, automobile components, air compressors and foundries are MSME industrial sectors based in Coimbatore
- Pump manufacturing units from Coimbatore plan to make motors for electric motorcycles and electric three-wheelers
- Tamil Nadu accounted for sale of ...

State govt to set up ₹100-crore EV cluster in district

Times News Network

A private company has prepared a detailed project report (DPR) and submitted it to the Tamil Nadu state government to set up an EV cluster in the Coimbatore district.

The state government is likely to allot Rs 100 crore to set up the EV cluster, and the revenue department officials are trying to identify around 500 acres near Arasur on Avinashi Road and a few more places on Pollachi Road in Coimbatore district.

The state government selected Mahindra &Mahindra to prepare the detailed project report to set up the EV cluster. The company submitted the DPR to the government last month.

"The state government has selected Coimbatore for setting up the EV cluster as the district has enough industrial facilities to make components for EVs and assemble them," an official from the MSME department said.

Times of India (30-1-24)

'U' turns in Coimbatore result of trial and error method, says Police Commissioner

Coimbatore City Police Commissioner V. Balakrishnan releasing the documentary short film 'U Turn' on Wednesday.
S. SIVA SARAVANAN

The Hindu Bureau
COIMBATORE

The 'U' turns implemented by the city police in ...

... of Commerce and Industry, Coimbatore, the Confederation of Indian Industry, the Southern India Engineering Manufactur-

The Hindu (25-1-24)

தி கோவை ஹெரால்டு
THE KOVAI HERALD

English & Tamil Weekly

04.02.2024 Sunday

Mixed Reactions among Coimbatore Industries on the Interim Budget - 2024

THE KOVAI HERALD

Union Finance Minister Nirmala Sitharaman presented the Interim budget 2024 in the parliament and the industries in Coimbatore have mixed reactions over the interim budget. Various industrial associations of Coimbatore presented different views after the interim budget was presented.

K. SENTHIL GANESH
President, Confederation of Indian Industries (CII), Coimbatore said, "Infrastructure has also been given more importance. The Coimbatore Airport expansion project has raised hopes that the work will start soon. The announcement of allocation of funds to set up charging stations for electric vehicles will benefit micro and small entrepreneurs" he said.

B.SRIRAMULU
Welcoming the budget, Indian Chamber of Commerce and Industry, Coimbatore (ICCIC) President Sriramalu said, "Various announcements including help for middle class families to build houses, tax incentives for start-up companies, implementation of new economic projects for integrated development, priority for airport expansion projects are welcome." he said.

D.VIGNESH
President of South Indian Engineering Manufacturers Association (SIEMA) said, "Many announcements are welcome including measures to provide free electricity up to 300 units with the help of solar energy power generation projects for houses, electric bus and railway projects. The lack of emphasis on MSME and manufacturing sector is regrettable." he said.

S K SUNDARARAMAN
Southern India Mills' Association (SIMA) President SK Sundararaman welcomed the announcements in the budget saying, "The budget is welcome as one towards the goal of making India a developed country by 2047. Allocation of funds to Cotton Corporation of India for procurement of cotton is welcome and more funds have been allocated for various projects. At the same time, the 11 percent import duty imposed on cotton should be removed. Imported synthetic fibers should be exempted from quality control mandates." he said.

G.KARTHIKEYAN
Auditor G.Karthikeyan, Former President of the International Entrepreneurs' Association said, "Allocating funds with emphasis on all the primary sectors like medicine, education, agriculture, start-up etc. is welcome. A budget that includes growth. Keeping the fiscal deficit under control at 5.1 percent shows a responsible approach." he said.

J. JAMES
Tamil Nadu Association of Cottage and Micro Enterprises (TACT) President J. James said, "It is disappointing that there are no announcements for small businesses. The non-reduction of GST to 5 per cent is very disappointing as we waited for announcements including the extension of 6 months to act on the legal provision for collection of taxes." he said.

C.SIVAKUMAR
Welcoming the interim budget, Coimbatore Tirupur District Micro and Cottage Entrepreneur Association (COTMA) President Sivakumar said, It is welcome that a new fund of Rs 1 lakh crore will be set up to provide interest-free loans to start businesses. Despite the announcement that MSME plays a major role in the country's Gross Domestic Product (GDP), there is a lack of announcements on the development of this sector," he said.

K.MANIRAJ
Kovai Power Driven Pump Manufacturers Association (KOPMA) President Maniraj said, "Employment and industrial growth in Coimbatore district has decreased in the last 7 years due to the imposition of GST. It is sad that Tamil Nadu parliamentarians do not speak up. The lack of announcements in the budget including reduction in price hike of raw materials is disappointing." he said.

M.RAVEENDRAN
Coimbatore Compressor Industries Association Raveendran said, "The lack of announcements on bank loans, receipt of timely payments, marketing, concessions for new industrial estates is disappointing. Much emphasis has been given to infrastructure development which is welcome." he said.

The Kovai Herald (4-2-24)

Coimbatore industries welcome plans to invest more in infrastructure

The Hindu Bureau
COIMBATORE

The Hindu (2-2-24)

0.5 & 1.5 HP VOLUTE CASING

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MODEL: 0.5 HP

PUMP PERFORMANCE TEST REPORTS

RATED VOLTAGE:230 volts

Speed	SUC Head	Del. Head	correction head	Total Head	Disch.	load current	Input power	Freq.	Performance at Rated Frequency(50HZ)					
									Total Head	Disch.	Output Power	Input Power	O.A.Eff.	suction
(rpm)	m	(m)	(m)	(m)	(lps)	(A)	(K.W)	Hz	(m)	(lps)	(K.W)	(K.W)	(%)	
2764	5.304	7.0	0.0	12.30	1.50	3.04	0.706	50.00	12.30	1.50	0.18	0.706	25.63	390
2765	4.624	10.0	0.0	14.62	1.30	2.99	0.692	50.00	14.62	1.30	0.19	0.692	26.93	340
2770	3.808	13.0	0.0	16.81	1.04	2.90	0.671	50.00	16.81	1.04	0.17	0.671	25.54	280
2791	2.992	16.0	0.0	18.99	0.74	2.75	0.634	50.00	18.99	0.74	0.14	0.634	21.73	220
2818	2.448	19.0	0.0	21.45	0.39	2.52	0.580	50.00	21.45	0.39	0.08	0.580	14.14	180
2846	2.176	23.0	0.0	25.18	0.00	2.26	0.518	50.00	25.18	0.00	0.00	0.518	0.00	160

AT POLY PRODUCTS, EVERY SINGLE COMPONENT MANUFACTURED IN THE COMPANY IS DESIGNED BY AN IN-HOUSE TEAM OF EXPERTS. THIS IN-HOUSE TOOL ROOM IS WHAT SETS POLY PRODUCTS APART FROM ITS COMPETITORS. THE AVAILABILITY OF THE TOOL ROOM HAS ALLOWED US TO CREATE OUR MOLDS AND MANUFACTURE PARTS USING THEM. THIS COMBINATION IS AVAILABLE IN ONLY CERTAIN FACTORIES WITHIN THE COUNTRY. THUS MAKING POLY PRODUCTS A ONE STOP SHOP FOR MOLD MAKING AND MOLDING.

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- SUITABLE FOR COASTAL REGION WHERE SALT WATER IS PRESENT. ALSO, SUITABLE FOR MARINE APPLICATION.
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- Non-Inductive Winding.
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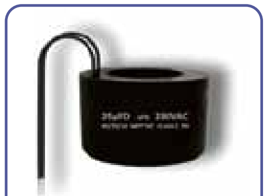
A.C. SUBMERSIBLE MOTOR RUN CAPACITORS


ANNULAR CAPACITORS


SPECIAL APPLICATION CAPACITORS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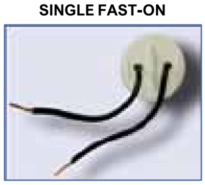
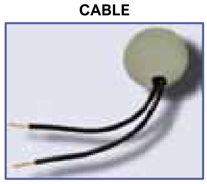
DOUBLE FAST-ON


SINGLE FAST-ON


CABLE


BI-POLAR SLEEVE INSULATED


BIPOLAR

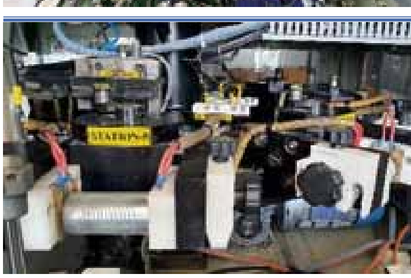

UNIPOLAR

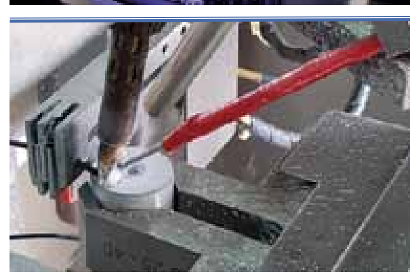
DESCRIPTION	DEFAULT PARAMETERS
DIELECTRIC	Metallized Polypropylene Film
DUTY FREQUENCY	50 / 60 / 120 Hz
CLIMATIC CATEGORY	40/85/56
CAPACITANCE TOLERANCE	±5 %, ±10 %, ±15 %
VOLTAGE TEST BETWEEN TERMINALS	2.0 Times Rated Voltage (10 seconds)
VOLTAGE TEST BETWEEN TERMINAL AND CASE	2.0 kV (2 seconds)
ANGLE OF LOSS Dv/dt – Tan Delta	≤20 X 10-4 / 20 (V/µs)
CLASS OF SAFETY PROTECTION	P0, P1, P2 / S0, S1, S2, S3
CLASS OF OPERATION	CLASS A / B / C / D
ENCAPSULATION	Dry Type – Bio-Degradable Polyurethane Resin
TESTED ACCORDING TO	IEC / BIS / UL STANDARDS
CERTIFIED	BIS, CE, RoHS
COMPLIANCE	REACH, UL 810

INFRASTRUCTURE


AUTOMATED WINDING


ROBOTIC-SPRAY METALLISATION


AUTOMATED ROUTINE AND TYPE TESTERS


ROBOTIC ASSEMBLY OPERATIONS

PRODUCT CERTIFICATIONS

IS : 2993
CM/L – 6500052005
Central Power Research Institute CPRI APPROVED
CE
RoHS 3 COMPLIANT EU 2015/863
REACH

MANAGEMENT CERTIFICATIONS

TÜV

- ISO 9001
- ISO 14001*
- ISO 45001*

Products have been Routine, Type and Endurance Tested at CPRI- Central Power Research Institute – Bangalore for Conformity to Applicable standards and Design requirements.

B J ELECTRONICS PRIVATE LIMITED

S.F. No. 426/1A, Texpark Road, Nethra Nagar, Coimbatore Civil Aerodrome Post, Coimbatore – 641 014.
PHONE : +91 9943398878, +91 9047038878 MAIL : bjelectronicspvtltd@gmail.com