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THE SOUTHERN INDIA ENGINEERING MANUFACTURERS' ASSOCIATION

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Managing Committee Meeting held on 21st February 2024

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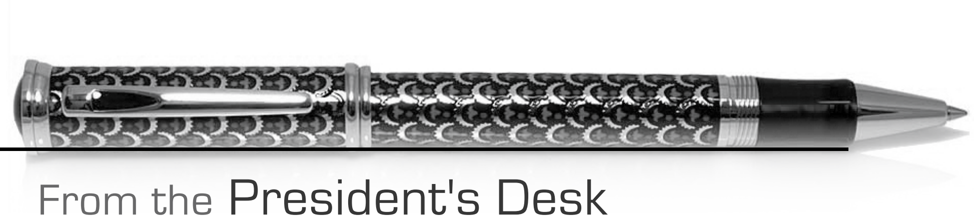

From the President's Desk

Dear SIEMA Members,

I am happy to share some exciting developments regarding our efforts to expand our presence in the US market and enhance our international export capabilities.

As part of our ongoing commitment to supporting our members in exploring new market opportunities, we have decided to form a Special Purpose Vehicle (SPV) dedicated to promoting the export of pumps. I am pleased to inform you that significant progress has been made in this regard.

During our recent discussions, it was decided to establish the SPV, with the aim of commencing operations from April 2024. The SPV will function under the banner "SIEMA EXIM PVT LTD."

This represents a pivotal step forward in our efforts to facilitate and streamline export activities, particularly in key markets such as the United States. Through this dedicated entity, we aim to provide our members with enhanced support, resources, and opportunities to capitalize on the growing demand for pumps in international markets.

In line with our focus on the US market, we are pleased to announce that discussions have already commenced with INXEPTION, a strategic partner specializing in export facilitation. Once the SPV is formally established, we will proceed with the necessary documentation and agreements to solidify our partnership with INXEPTION, paving the way for smoother export processes and market penetration in the United States.

We are committed to ensuring that our members have access to the tools, networks, and support systems needed to succeed in the global marketplace. Moving forward, we will continue to explore additional avenues for collaboration, expansion, and growth, with a steadfast commitment to serving the best interests of our esteemed members.

Thank you for your ongoing support and participation in SIEMA's initiatives. Together, we can unlock new opportunities, achieve greater success, and elevate the profile of Coimbatore's pump industry on the global stage.

Should you have any questions or require further information, please do not hesitate to contact us.

Warm Regards,

D. Vignesh

Mission

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

& Vision

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

In this issue

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SIEMA Activities Corner

TECHNICAL CALENDAR OF EVENTS (BIS/BEE)

Technical committee members discussed on the Letter from BEE dated 14.02.2024 for a minimum 4 Star requirement and analyzing the feasibility.

The letter from BEE displayed below for your reference:

पंकज अग्रवाल, भा.प्र.से.
सचिव
Pankaj Agarwal, I.A.S.
Secretary

भारत सरकार
विद्युत मंत्रालय
श्रम शक्ति भवन, नई दिल्ली-110001
Government of India
Ministry of Power
Shram Shakti Bhawan, New Delhi - 110001
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E-mail : secy-power@nic.in

D.O. No.8/8/2022-EC February 06, 2024

Dear Secretary,

As you are aware that energy-efficient electrical appliances and equipments installed in an establishment not only save energy but also have immense benefits for the environment in terms of reduced emissions. In this regard, Bureau of Energy Efficiency (BEE), under the Ministry of Power launched Standards & Labelling (S&L) program in 2006, to provide the consumers an informed choice about the energy consumption by displaying star labels on the appliances. The list of appliances covered under star labelling program is enclosed at Annexure-I for your reference.

In order to enhance the adoption of energy efficient appliances, I would like to request you to issue necessary directions to your secretariat, attached offices and subordinate offices under your ministry/ department to ensure that while procuring the appliances, mentioned at Annexure - II, carry the threshold BEE star rating as indicated against each of them.

Further, as a continued measures towards adoption of energy efficient appliances, I would also advise you to consider procurement of any of such appliances, which are covered under S&L program but not mentioned in Annexure - II, to be of 4-Star or above rating. The details of models of respective appliances approved by BEE are also available at *www.beestarlabel.com*.

regards,

Yours sincerely,

Encls : as above

(Pankaj Agarwal)

To the Secretaries of Ministries/Departments of Govt. of India

स्वच्छ भारत
एक कदम स्वच्छता की ओर

आज़ादी का अमृत महोत्सव

Annexure - I: ***List of appliances covered under Star Labelling Program:***

Mandatory Appliances	Voluntary Appliances
1. Room Air Conditioners-Fixed Speed	1. Induction Motors
2. Inverter Air Conditioner	2. Pump Sets
3. Room Air Conditioner (Cassette, Floor Standing)	3. LPG-Stoves
4. Frost Free Refrigerator	4. Diesel Engine Driven Monoset Pumps
5. Direct Cool Refrigerator	5. Ballast (Electronic / Magnetic)
6. Tubular Florescent Lamp	6. Office Equipment's (Printer, Copier, Scanner MFD's)
7. DistributionTransformer	7. DG Sets
8. Color TV	8. Microwave Ovens
9. Storage type Electric Water Heater	9. Solar Water Heater
10. LED Lamps	10. Air Compressors
11. Ceiling Fans	11. Solid State Inverter
12. Light Commercial Air Conditioners	12. Computer (Notebook / Laptops)
13. Deep Freezers	13. Li-ion traction batteries and systems
14. UHD TV	14. Tyres
15. Washing Machine	15. Induction
16. Chillers	16. Table Fan / Wall Mounted Fan
	17. Pedestal Fan
	18. Side by Side Refrigerator
	19. Solar PV Module

Annexure - II: ***The appliances and the minimum threshold BEE star rating are tabulated below***

S.No.	Appliance	Threshold Star rating
1.	Split Air conditioner	5 Star
2.	Window Air conditioner	5 Star
3.	Room Air Conditioner (Cassette, Floor Standing)	5 Star
4.	Light Commercial Air Conditioner	4 Star
5.	Frost Free Refrigerator	4 Star
6.	Direct Cool Refrigerator	4 Star
7.	Storage Type Electric Water Heater	5 Star
8.	LED Lamps	5 Star
9.	Ceiling Fans	5 Star
10.	Distribution Transformer	3 Star


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Farm Equipment
CNC Machined Tubular Parts
CNC Machined Tubular Parts,
Sub Assemblies & Stainless Steel Welded tubes
For Pumps Sector
Textile Machinery Tubes & Parts
SIERRA USA - SRB - Skiving and Roller Burnishing
Bore 40-200mm x Length 2000mm, 6000mm
Honing - Bore 20-45mm x Length 600mm
Stainless Steel Tubemill
OD Range 50-150mm x
Thickness 0.50-4.00mm
Fiber Laser Cutting
For Stainless Steel and
Carbon Steel Tubes
● Cold Drawn Tubes - Seamless & Welded (CDS/CDW)
● Hydraulic Cylinder Tubes (SRB/Honed) ● Stainless Steel Welded Tubes
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SIEMA Activities Corner

(…continued)

SUBJECTS RELATING TO CENTRAL & STATE GOVERNMENT

Stakeholder consultation for a Research Park in Bharathiar University

The key stakeholder consultation meeting was held at the Syndicate Hall, Bharathiar University Campus, Coimbatore, from 11:30 AM to 1:30 PM on 3rd Feb 2024. Like the Research Park present in IIT, Chennai, they are planning for a Research Park in Bharathiar University, which is a strategically important initiative by the Government for both Coimbatore city and the State of Tamil Nadu.

MC Members attended the meeting.

RISE TN: Resilient Inclusive and Sustainable Enterprises - Tamil Nadu Market Strategies & Project Opportunities for MSMEs in EV Sector was held on 2nd February 2024 in CODISSIA

President Sri. D. Vignesh attended the meeting and distributed Certificates to the participants in the skilling program.

Representation to Honourable Finance Minister Smt. Nirmala Sitharaman on 8th February, 2024

Representation was sent to the Honorable Finance Minister Smt. Nirmala Sitharaman regarding Request to Amend Section 43B(H) Allowing 90 Days for Settlement of Payment within MSME Enterprises. Acknowledgement of the same was received.

DMK Meeting - Smt. Kanimozhi Karunanidhi's visit to Coimbatore on 10th February 2024

President Sri. D. Vignesh attended the event, Representation was given to Smt. Kanimozhi Karunanidhi on 10th February, 2024. Subject: Submission of Points for Election Manifesto.

ADMK's Meeting On 10th February 2024

Vice President Sri. Mithun Ramdas attended the meeting. Representation was submitted on the Election Manifesto.

REPRESENTATION TO VARIOUS BODIES

Discussion with Mr. Nirmal Kumar & Team from CapGrid: On 30th Jan 2024

President Sri. D. Vignesh met Mr. Nirmal Kumar and the team from CapGrid on 30th Jan 2024 to discuss on Collective Procurement for B & C class items for our members.

Visit of Dr. Vinod Tare - Meeting was organised by Siruthuli

THE VISIT OF DR VINOD TARE ON 03.02.2024 Dr Vinod Tare, Founding Head of cGanga and Professor at IIT Kanpur, visited Siruthuli on 3rd February, 2024. He was received at Noyyal Life Centre by Siruthuli Team. A brief presentation was made on the salient features of the Noyyal River System and the issues of sewage plaguing the system at various points. Vice President Sri. R. Arun and few of our MC Members attended the meeting.

Meeting with CEO of CSB Bank on 8th Feb 2024

President Sri. D. Vignesh along with other Industry Associations had a meeting with Shri. Pralay Mondal, Managing Director & CEO of CSB Bank Ltd., today to discuss about the requirements and expectations of MSME's from Banks, at Radisson Blu.

VISION DOCUMENT Program - by CHAMBER On 14th February 2024

President Sri. D. Vignesh attended the meeting. A Representation was submitted to Shri. B Sriramulu, President, Chamber.

Subject: Vision Document for Coimbatore.

Nalla Thanni Technical Committee Meeting

7th February 2024 – 5.00 pm;   Venue: NLC

Members Attended: *Mr. J Sathish, Trustee, Siruthuli Mr. R S Krishnaswamy, Steering Committee Member, Siruthuli Mr. S J Balakrishnan, Apex Member, Siruthuli Mr. D Balasundaram, Chamber (Virtual) Mr. R Arun, Vice-President, SIEMA Mr. Mohan Senthilkumar, President, SITARC Mr. C Chinnasamy, Chief Coordinator, Siruthuli Mr. L Cibi Mahiban, Program Associate, Siruthuli Ms. V Raksha, Program Associate, Siruthuli*

Discussion Highlights

Various sewage treatment technologies explored by Siruthuli so far were taken up for discussion. Nualgi, Aquaritin and Bint were phyco-remediation technologies. All these technologies are proven. The capital cost is negligible but the cost for continuous dosing was found to be prohibitive.

Installation of a Pilot Plant based on the technology of c-Ganga was discussed. All were convinced that this is the only case where results were visible and would serve to convince the Government and the donors.

Two locations were discussed, one at an urban location adjacent to the STP at Periakulam and the other a rural location at the channel at Sundapalayam. It was decided that we forward our Expression of Interest (EoI) to cGanga to enable them begin the process of sending us a proposal.

Another location on the northern side in Periakulam was also considered and Siruthuli team will be undertaking a study. Raw sewage is being let into the tank at this point.

The next step will be to assess the flow at these points over a period of one week.

The technology possessed by Bioman will be useful for smaller volumes and can be considered there.

Siruthuli will follow up with PSG Institute of Advanced Studies to study the solution given by Dr Thava Palanisamy.

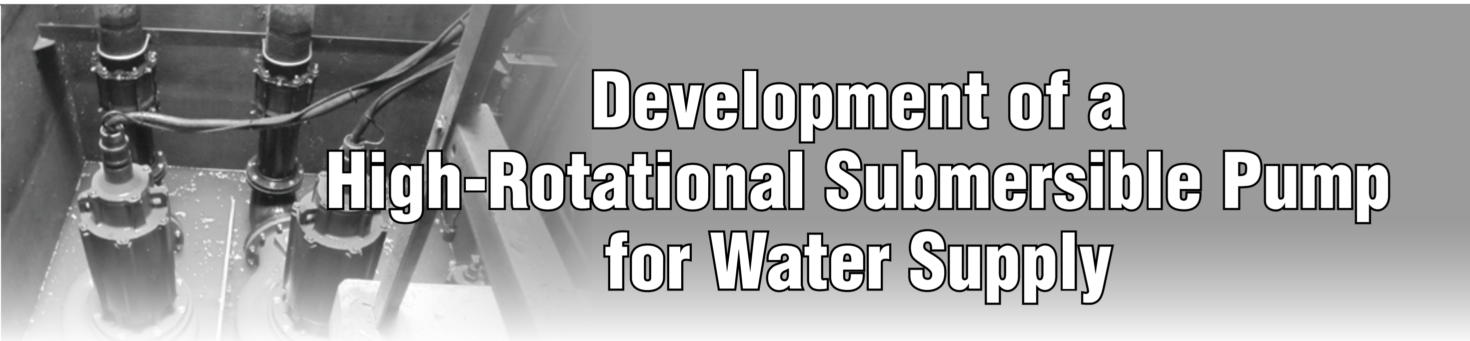
It was suggested that a video be prepared to create awareness on waste disposal and be exhibited across the city and at the location where we install the Pilot Plant.

Identifying a suitable end use for the treated water was emphasized. In case of tanks, increase in catch of fish may result in the fisherfolk helping us in our initiatives and may also lead to them treating the water on their own. Though the treated water may be free from odour, it will not be fit to sell due to the pale colour. In the case of cGanga treatment in the streams, the water is clear and will be fit for sale. Such initiatives will only help sustain the treatment.

Discussions also pertained to establishing bar screens across channels to prevent flow of solid waste. A suitable mechanism must be developed.

Action Points

1. *Meeting with the Corporation Commissioner for acquiring necessary permissions.*
2. *Expression of Interest to be sent to c-Ganga.*
3. *Get proposals for both Periakulam and Sundapalayam for flow measurement from AuM systems.*
4. *Steps to be initiated to source the technology embedded in the STP demonstrated by cGanga and to manufacture the plant locally.*



Development of a High-Rotational Submersible Pump for Water Supply

Vladyslav Kondus, Ivan Pavlenko*, Oleksandr Kulikov E and Oleksandr Liaposhchenko

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Abstract

Submersible pumps are the leading electricity consumers in centralized water supply systems. Considering the cost structure of the life cycle of pumping equipment, the main costs should include investment costs, electricity costs during operation, and costs of repairing pumping equipment. Considering the growing cost of electricity in the world, the cost of manufacturing pumping equipment is significantly increasing, which in turn causes an increase in its price. The key factor in increasing the competitiveness of such equipment on the market is its modernization with the achievement of a higher level of energy efficiency with a simultaneous reduction in cost due to a reduction in weight and dimension parameters. In the research, a significant increase in the head from 15 m to 65 m of the submersible pump stage was achieved by increasing the rotation frequency from 3000 rpm to 6000 rpm and designing the pump for this rotation frequency. As a result, the pump head, created by the flowing part with the basic stage (eight pieces), can be provided by the pump using only two designed stages. It creates the prerequisites for reducing the mass of the pump from 200 kg to 45 kg, or by 77.5%. Also, in designing the pump, energy efficiency was increased from 74.6% (for the existing pump) to 79.4% (by 5% for the developed pump). The research results made it possible to significantly contribute to reducing the cost of the life cycle of the submersible pump installation.

Keywords: *energy efficiency; life cycle; process innovation; sustainable development; water supply.*

1. Introduction

In centralized water supply systems, an essential element is water intake, which must function as a reliable water source in quantity and quality[1]. At the same time, water intake from natural reservoirs (e.g., lakes, rivers) or an artesian well can be used as a source of water supply[2].

Considering the quality of the liquid, artesian water has a much higher level of purity than that taken by water intake from open natural reservoirs[3].

Borehole pumps are mainly designed to supply water from artesian wells (Figure 1). They are widely used at water intake stations and other enterprises where water supply from deep mines is necessary[4]. Pumps of this type are also actively used in the gas and oil industry[5].

Pumps for supplying water from artesian wells are installed directly in the pipes, so they have a limited diametrical overall size. This is the main difficulty in their design because the limited diameter of the impeller is the main factor in the limited amount of pressure it creates[6]. As a result, pumps of this type are designed with a multistage design[7].

Depending on the configuration, the pump sections can have 5-10 or even more stages in case a high head is required[8]. When the impeller rotates, the liquid from the first stage is transferred to the second and then to the third[9]. Such a principle allows the increase in the kinetic energy of the liquid, correspondingly increasing the pressure[10].

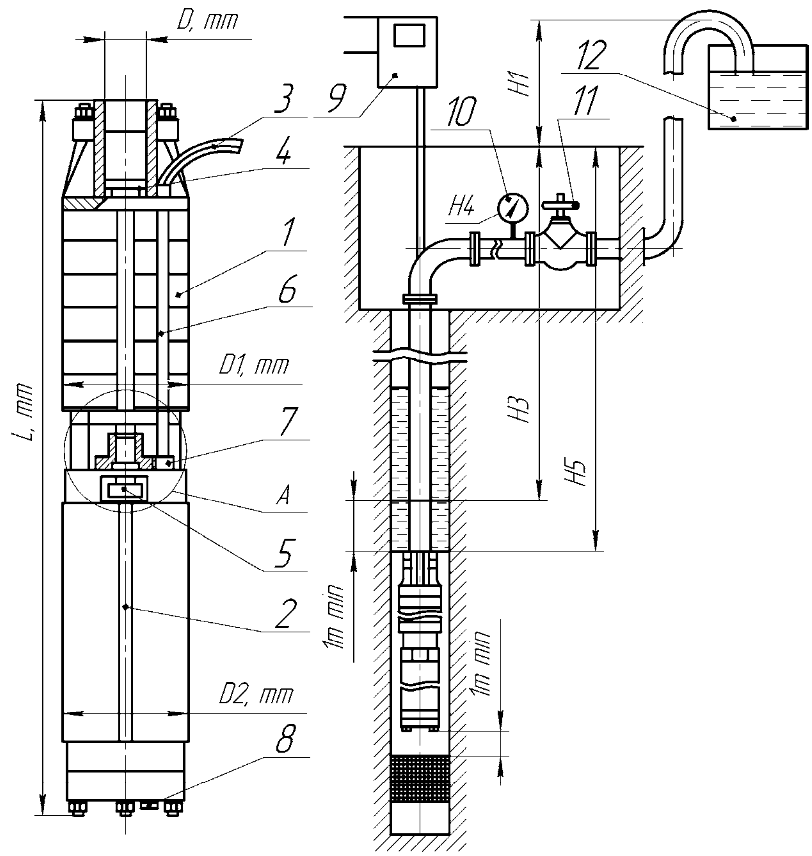


Figure 1: *Construction and installation conditions of well pumps: 1—pump part; 2—electric motor; 3—power cable; 4—valve; 5—plate; 6—casing; 7—protective net; 8—drain plug; 9—pump control and protection station; 10—manometer; 11—latch; 12—storage capacity*

The appropriate brand is selected to achieve the optimal pressure-supply value based on the tasks set before the unit. Submersible-type pumps are equipped with a safety valve that regulates the water column in the event of a sudden engine stop, facilitates restarting, and protects the rotation of the blades in the opposite direction[11].

The dimensions of submersible pumps, depending on the functionality, vary up to three meters or more, the mass reaches more than half a ton, and the head is more than 600m. The pump casing is made of cast iron or corrosion-resistant steel. Smaller analogs of submersible pumps are used in agriculture and even for household needs in homesteads or provide drinking well water to the house.

Submersible pumps[12] are the primary electricity consumers in centralized water supply systems. Considering pumping equipment's life cycle cost structure, the main costs should include investment (development, manufacturing, installation, start-up, and adjustment works), electricity during operation, and repairing pumping equipment.

The characteristics of the submersible pump unit of the ECW type (Figure 2) are presented in Table 1[13].

ECV pumps are marked as follows. E means driven by a submersible electric motor, C means centrifugal pump, W means designed for water supply, the first number is the diameter of the casing pipe into which the pump is installed, the second number is the pump flow rate in m^3/h, and the third number is the pump head in meters.

According to Eurostat data on the electricity cost dynamics in the European market during 2022, it should be noted that considering the growing cost of electricity in the world, the cost of manufacturing pumping equipment increases significantly[14], which in turn causes an increase in its price[15]. Taking this into account, the key factor in increasing the competitiveness of such equipment on the market is its modernization, achieving a higher energy efficiency of the

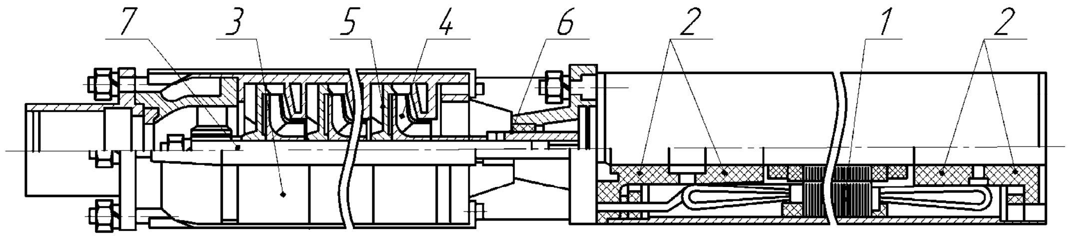


Figure 2: *ECW 10-65-150 pump: 1 - electric motor, 2 - bearings, 3-stage, 4-impeller, 5-guide vanes, 6-coupling, 7-shaft*

Table 1: Design features of ECW-type pumps

Parameters of ECW Pump	ECW 10-65-150 (ø260 mm)		ECW 10-63-150 (ø260 mm)		ECW 8-63-110 (ø205 mm)		ECW 8-65-160 (ø205 mm)
	Berdiansk	RPE Kharkiv Electro-Mechanical Plant	Livny City	Azov-Energomash	Berdiansk City	Livny City	Livny City
Casing pipe diameter		260 mm		205 mm			
Flow rate, m^3/h	65	63	63	63	65	65	65
Head, m	22.5	150	150	150	110	110	160
Electric motor, kW	27	45	35	37	45	32	33
Supply Voltage, V	31.5	380	380	380	380	380	380
Length, mm	2000	2040	1520	2040	3100	1930	2580
Mass, kg	200	294	198	294	147	173	235
Min well flow rate, m^3/h	130	130	126	130	126	130	130
Nominal current A	93.0	92.5	77.0	92.5	66.0	70.0	104
Number of stages, pcs	8	7	7	8	13	13	13

pump than that of analogs existing on the pump equipment market with a simultaneous reduction in the production cost due to a reduction in its weight and overall dimensions[16].

Due to the above-mentioned analysis, the research aims to reduce the life cycle cost of submersible pumps and pumping units based on them.

To realize this aim, the following research tasks were set:

(1) Development of the structural scheme of the pump and design of the elements of its flowing part with reduced weight and dimensions;

(2) Selection of the numerical research method, initial conditions, and turbulence model;

(3) Performing a numerical study of hydrodynamic processes in the elements of the flowing part of the developed pump in order to ensure a high level of energy efficiency and obtain the resulting energy characteristics of the pump;

(4) Analysis of research results.

Achieving this aim will make it possible to implement measures to achieve several UN Sustainable Development Goals[17], e.g., clean water and proper sanitation; affordable and clean energy; and industry, innovation, and infrastructure.

2. Materials and Methods

As a pump for modernization, the ECW 10-63-150 pump was chosen, the operating parameters of which are given in Table 1. For its modernization and replacement, a new pump was designed with an increased frequency of shaft rotation up to 6000 rpm. Due to the increased frequency of rotation, the impeller can create a significantly higher head[18]. This will make it possible to reduce the number of stages, influencing the reduction in mass and dimensions. The main requirement of the pump is that the diameter size should not exceed 260 mm to ensure operation as a replacement for the existing fleet of this pump.

The newly designed pump (Figure 3) has two stages. At the same time, the existing currently in use ECW 10-63-150 pumps use a flowing part with 8 stages[19]. The developed design of the pump made it possible to reduce the weight of the pump from 200 kg (for the existing ECW 10-63-150 pump) to 45 kg, that is, by 77%.

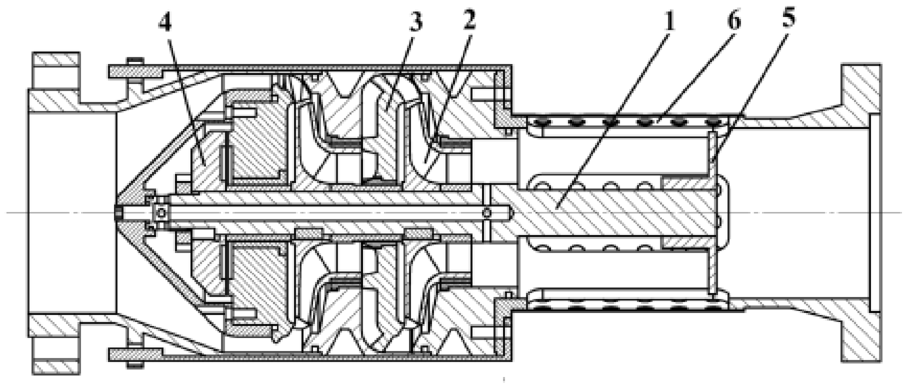


Figure 3: *Developed pump: 1 - shaft, 2-impeller, 3-guide device, 4-automatic balancing device, 5-coupling, 6-mesh*

The operating position of the pump is vertical. The pump has a shaft 1 on which stages consisting of an impeller 2 and a guide device 3 are located. For unloading the residual axial force, an automatic balancing device 4 is used at different operation modes [20, 21] for pump operation with different values of the flow rate parameter from zero to maximum when the pump's efficiency is maximum. At the end of the shaft, there is a coupling 5, which allows for connecting the pump shaft with the motor shaft.

Shaft 1 causes the impeller 2 to rotate. The liquid from the underwater device enters the impeller 2 through the grid 6. After that, it enters the guide vanes 3, which redirect the fluid flow to the next stage. As the fluid passes through all pump stages, it gains energy and leaves the pump. Part of the liquid enters the hydraulic heel, where axial force is unloaded. The spent liquid is returned to the supply through the drain hole in the pump shaft, an essential feature of the developed pump. The through shaft allows for increasing the pressure at the entrance to the first stage of the pump, which significantly improves the cavitation properties of the pump[22]. The total length of the pump without an electric motor is 550 mm, 72.5% less than the existing analog.

According to the developed design scheme, the design of 3D models of the elements of its flowing part, the centrifugal impeller, and the guide vanes was performed in Solid Works 2018. Numerical research of the flow parameters of the pumped liquid was carried out using the ANSYS CFX 13.0 software complex in the flow rate range from $Q = 0.05 \cdot Q_{BEP}$ to $Q = 1.8 \cdot Q_{BEP}$ (where BEP is the best efficiency point, the operational flow rate when the best efficiency η is reached). To ensure the correct operation of the numerical research in ANSYS CFX, elongated sections are made near the inlet and outlet of each element of the flow part. This software product has proven to be accurate in modeling the operating process of dynamic

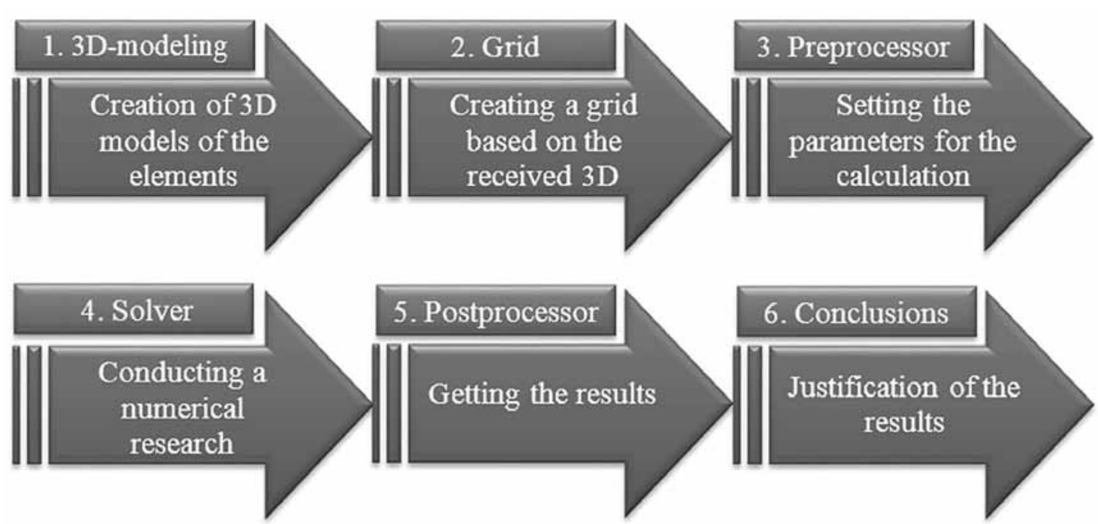


Figure 4: *Stages of research implementation*

pumps. In particular, the research error does not exceed 5%, which fully meets the requirements for the accuracy of engineering calculations[23]. The scheme of the research is given in Figure 4.

The ANSYS CFX was used based on the numerical solution method of the fundamental hydromechanics laws. It was repeatedly tested in solving the problems of pump design, and the discrepancy between the numerical and physical modeling results does not exceed 5%; therefore, this software product is suitable for solving the stated research problem.

The modeling of turbulent fluid flow is performed using Reynolds equations (i, j = 1-3) [24, 25]:

$$\frac{\partial}{\partial t}(\rho U_i) + \frac{\partial}{\partial x_i}(\rho U_i U_j) = -\frac{\partial p}{\partial x_j} + \frac{\partial}{\partial x_i}\left[\mu\left(\frac{\partial U_i}{\partial x_j} + \frac{\partial U_j}{\partial x_j}\right)\right] + f_i, \tag{1}$$

$$\vec{f}_i = -\rho\left[2\vec{\omega} \times \vec{u} + \vec{\omega} \times \left(\vec{\omega} \times \vec{r}\right)\right], \tag{2}$$

$$\frac{\partial p}{\partial t} + \frac{\partial}{\partial x_i}(\rho U_j) = 0, \tag{3}$$

where x_i and x_j are coordinate axes; u_i and u_j are velocity components; p is pressure; t is time; f_i are mass forces; $\vec{\omega}$ is the vector of the angular velocity of rotation; $\vec{r}$ is the radius vector; ρ is the density of the pumped liquid, kg/m^3; and μ is the dynamic viscosity, m^2/s.

While modeling turbulent flows in the Navier-Stokes equation, the instantaneous velocity is replaced by the sum of the Reynolds averaged velocity and the pulsating component of the velocity. The dependence (1) takes the following form[26]:

$$\frac{\partial}{\partial t}\left(\rho\vec{U}_i\right) + \frac{\partial}{\partial x_i}\left(\rho\vec{U}_i\vec{U}_j\right) + \frac{\partial}{\partial x_j}\left(\rho\vec{U}'_i\vec{U}'_j\right) = -\frac{\partial p}{\partial x_j} + \frac{\partial}{\partial x_i}\left[\mu\left(\frac{\partial U_i}{\partial x_j} + \frac{\partial U_j}{\partial x_j}\right)\right] + f_i, \tag{4}$$

where $\vec{U}_i$ and $\vec{U}_j$ are time-averaged velocity values; and $\vec{U}'_i$ and $\vec{U}'_j$ are pulsating components of velocities.

In the course of the research, the ANSYS CFX software was used to record the values of the flow rate Q (m^3/h), the torque on the pump impeller M (N·m), and the fluid velocity at the outlet and inlet of the pump v_2 and v_1 (m/s). The values of head H (m), useful power N_u (W), power consumed by the pump N_c (W), and the efficiency η were calculated depending on the following parameters:

$$H = (z_2 - z_1) + \frac{p_2 - p_1}{\rho g} + \frac{v_2^2 - v_1^2}{2g}; \tag{5}$$

$$N_u = \rho g Q H; \tag{6}$$

$$N_c = M\omega; \tag{7}$$

$$\eta = \frac{N_u}{N_c} = \frac{\rho g Q H}{M\omega}, \tag{8}$$

where z_2 and z_1 are the height of the outlet and inlet levels of the pump, m; ω is the angular velocity of the impeller rotation, rad/s.

The design of calculation meshes of the pump's flowing part elements was performed in the software component ICEM CFD 13.0[27]. The wall layer is made as follows. The thickness of the

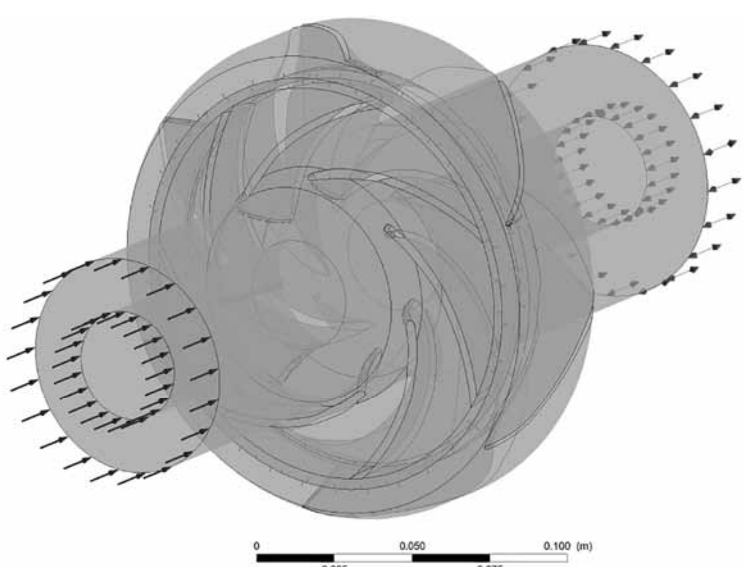


***Figure 5:** Calculation area, solid-state model of the stage*

first layer was 0.04 mm. The sizes of subsequent layers increased exponentially with an index of 1.5. The number of layers in the wall layer is 7. In the region of the wall layer, the cells have a prismatic shape, and in the region of the rest of the flow, they have the shape of a tetrahedron.

The calculation area (Figure 5) was created in the CFX-Pre 19.0 package.

The operating environment was water with a temperature of 20°C. The mode was turbulent. To conclude the Reynolds equations, the standard k-ε[28] turbulence model was used, which has proven itself well in conducting studies of the flow in the flow part of centrifugal pumps[29].

The value of the variable y+, which characterizes the thickening of the mesh near the walls, was within 20 < y+ < 100, which had an exact match with the error of engineering measurements in previous studies of centrifugal pumps during field tests[30].

3. Results

The analysis of the research results was carried out in the CFX-Post 19.0 environment.

The following drawings were made to study the qualitative picture of fluid movement through the pump's flow part and make corrections to its structural elements.

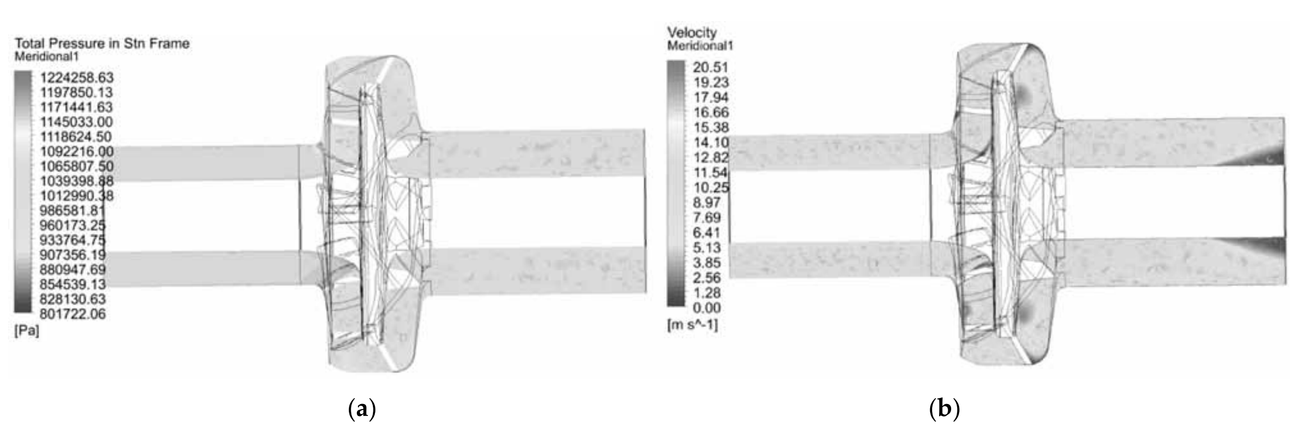
In the beginning, modeling of the basic stage of the ECW 10-63-150 pump (Figure 6) was carried out to obtain its characteristics and the liquid flow pattern in the intervane channels of the impeller and guide vanes.

Analysis of the qualitative picture of the relative velocity distribution (Figure 6b) during the rotation of the impeller proves the efficiency and its effect on the head created behind the impeller[31]. The existing zones of slightly reduced (blue color) relative velocity have a pronounced character and are explained by vortex formation and pressure changes.

Table 2 shows the pump parameters of the stage in different operation modes obtained from the initial model of the ECV 10-63-150 pump using the above-mentioned numerical simulation approach. It is essential to see how the pump functions not only at the BEP (best efficiency point) but also in other operating modes ($Q < Q_{BEP}$, $Q > Q_{BEP}$). This is explained by the fact that the pump can function in different operating modes. A decrease in the operating parameters (head, power, efficiency) on the modes ($Q < Q_{BEP}$, $Q > Q_{BEP}$) can lead to a deterioration of the pump operating conditions, in particular on the starting modes (cavitation phenomena, surging), which reduces the service life of the pump and increases the risk of premature failure of its design elements. Taking this into account, we present the pump's operating parameters in a wide supply range, $Q = 0.05\text{-}1.8\ Q_{BEP}$, for a complete analysis of the obtained results.

For the next research stage, using the design methodology according to[32], a stage consisting of an impeller and a guide vane with an increased rotation frequency of 6000 rpm was developed (model 01).

Figure 7 shows the characteristics of the stage in different operating modes obtained using the quasilinear regression approach[29]. Figure 8 shows the flowing part's pressure and relative velocity distributions (model 01). The red line shows the dependence of the consumed power N_c on the flow rate of this design pump Q. The green



(**a**) (**b**)

Figure 6: *Qualitative picture of the distribution in the basic pump stage's flowing part: (a) total pressure; (b) relative velocity*

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Table 2: Characteristics of the basic stage of the ECW 10-63-150 pump

Duty Point	Flow Rate Q, m^3/h	Head / m	Efficiency, %
0.05	3.25	18.97	10.55
0.10	6.50	19.28	19.85
0.20	13.0	19.28	33.98
0.40	26.0	19.14	51.88
0.60	39.0	18.26	64.41
0.80	52.0	16.40	72.33
1.00	65.0	14.75	74.55
1.20	78.0	11.97	70.17
1.40	91.0	8.440	58.53
1.60	104	4.300	35.65

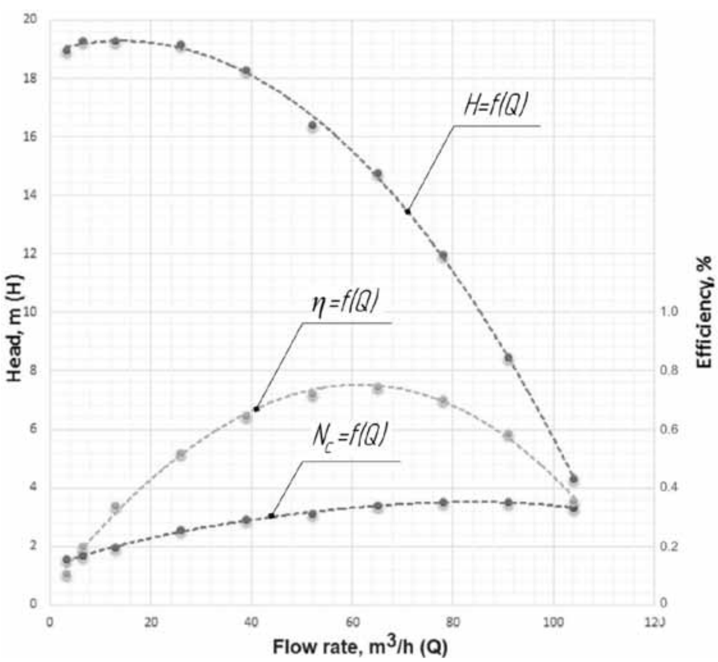


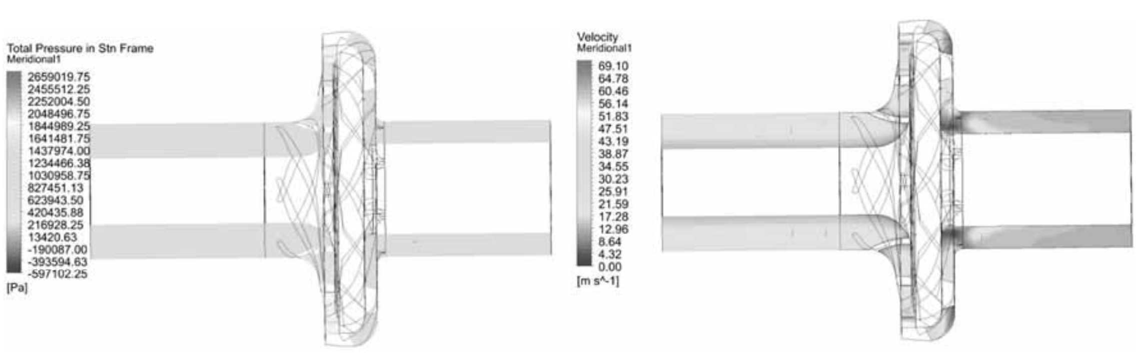
Figure 7: *Characteristics of the basic stage of the ECW 10-63-150 pump*

line shows the dependence of the pump efficiency on the flow rate of this design pump Q, and the blue line shows the dependence of the pump head H on the flow rate of this design pump Q.

Analysis of the qualitative picture of the relative velocity distribution during its rotation inside the guide vanes shows that there are reduced (blue color) and increased (red color) relative velocity zones with a pronounced character. This is explained by forming a vortex due to the separation of the liquid flow from the part's surface and the change in pressure in these areas[16]. The significant vortices occur in the outlet channel of the guide vanes, which decrease the entire stage's efficiency. Therefore, it can be concluded that the guide vanes do not perform their function correctly due to the significant narrowing of the passage channel and the friction of the viscous layers of liquid between themselves [33]. The guide vanes create additional hydraulic losses at increased rotation frequency despite the design methodology. At the same time, the function of converting kinetic energy into potential energy is only partially fulfilled, as shown by an additional literature review on this problem[34].

The relative velocity distribution in the stage proves the need for its improvement and the correctness of the selection of the guide vanes. Unfortunately, existing design methods for today are not designed for the design of the flowing part of submersible pumps with a rotation frequency of more than 3000 rpm.

Due to narrowed guide vanes (Figure 8), the operating point shifted to the area of lower flow rates at increased rotation frequency. At the same time, the operating point had the following parameters: the flow rate was about 28 m^3/h



(a) (b)

Figure 8: *Qualitative picture of the distribution in the developed pump stage's flowing part (model 01): (a) total pressure; (b) relative velocity*

and the head was about 106 m with the highest efficiency value equal to 73% (Table 3).

Table 3: Characteristics of the developed stage of the ECW 10-63-150 pump (model 01)

Duty Point	Flow Rate Q, m^3/h	Head / m	Efficiency, %
0.05	3.5	103.2	18.26
0.20	14	107.7	54.87
040	28	106.3	72.82
0.60	42	75.13	64.79
0.80	56	42.96	43.14
1.00	70	9.040	10.60

The next step in the research was the improvement of the guide vanes to reduce hydraulic losses. As a result, a vaneless guide vane (model 02) was created with a channel width of 15 mm [35] in the transfer and inlet channels to prevent flow compression and vortex formation (Figure 9).

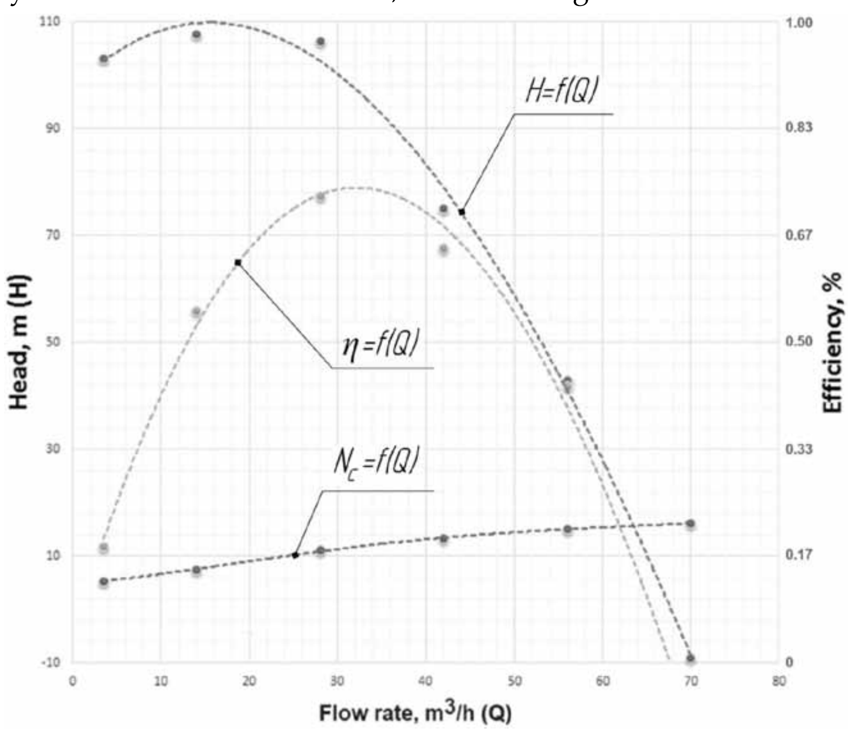


Figure 9: *Characteristics of the developed stage of the ECW 10-63-150 pump (model 01)*

The total pressure and relative velocity distributions in the developed pump stage's flowing part with vaneless guide vanes (model 02) are presented in Figure 10.

Analysis of the qualitative picture of the relative velocity distribution (Figure lOb) during the impeller rotation proves the correctness of the direction of improvement of the guide vanes. There are zones of slightly reduced (blue color) and increased (red color) relative velocity after the fluid leaves the guide vanes, which have a strongly pronounced character and are explained by the mixing of liquid layers among themselves[36]. This design shifted the optimum point to the region of increased flow rates.

Due to the expansion of the guide vanes, the operating point (Table 4) had the following characteristics: the flow rate was about 84 m^3/h and the head was about 46 m with the highest efficiency value equal to 59%.

The pressure characteristic (Figure 11) is constantly falling, which is a satisfactory result from the point of view of pump operation.

At the next stage of the research, the guide vanes were improved by adding vanes with constant thickness to equalize the pressure characteristics of the stage (model 03).

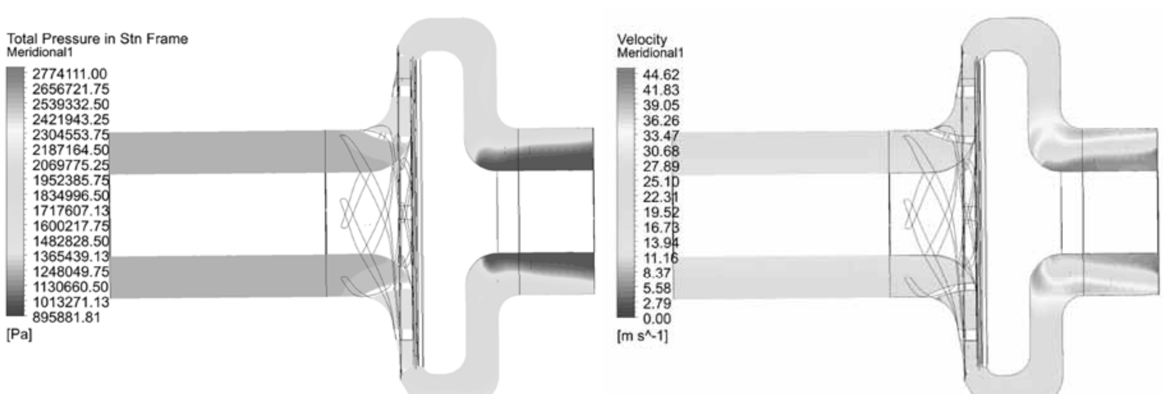


Figure 10: *Qualitative picture of the distribution in the developed pump stage's flowing part with vaneless guide vanes (model 02): (a) total pressure; (b) relative velocity*

Table 4: Characteristics of the developed stage of the ECW 10-63-150 pump with vaneless guide vanes (model 02).

Duty Point	Flow Rate Q, m^3/h	Head / m	Efficiency, %
0.05	3.5	65.0	16.36
0.20	14	52.5	27.30
0.40	28	43.1	40.00
0.60	42	43.2	34.07
0.80	56	45.8	42.38
1.00	70	48.0	51.77
1.20	84	45.7	58.65
1.40	98	33.4	52.69
1.60	112	33.5	52.75
1.80	126	17.0	47.81

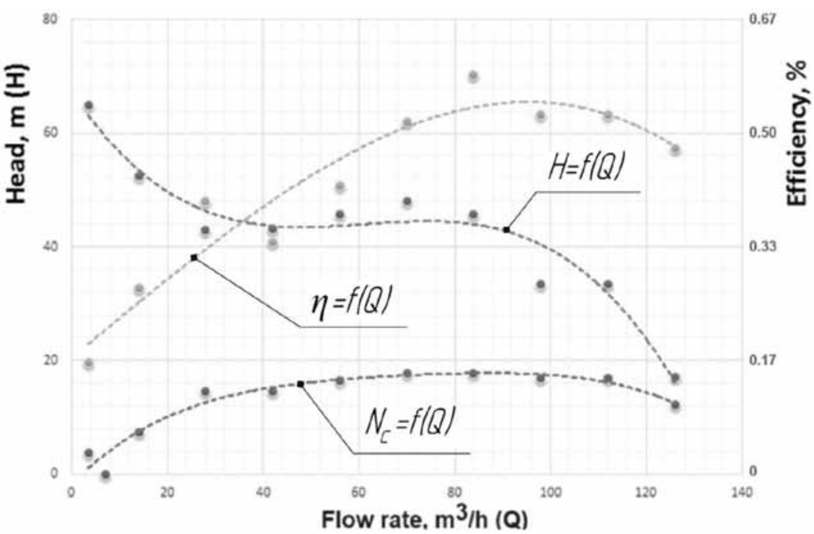


***Figure 11:** Characteristics of the developed stage of the ECW 10-63-150 pump with vaneless guide vanes (model 02)*

Analysis of the qualitative picture of the relative velocity distribution (Figure 12) during the impeller rotation proves the correctness of the improvement of the guide vanes.

The main problem was the poor inflow onto the vanes of the guide vanes, which led to additional hydraulic losses, characterized by zones of slightly reduced (blue color) relative velocity in the intervane channels of the guide vanes.

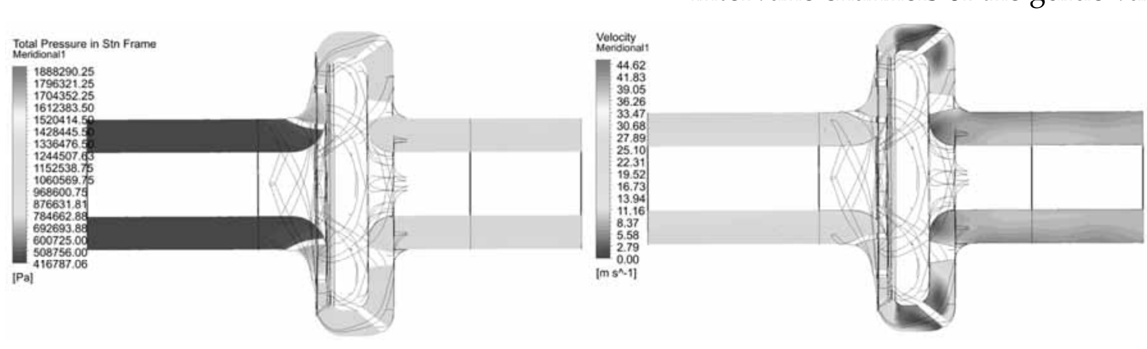
According to the research results, the appropriate pressure characteristic of the stage was obtained (Table 5).

The operating point shifted towards slightly increased flow rates and had the following characteristics (Figure 13): the flow rate was about 70 m^3/h and the head was about 62 m with the highest efficiency value equal to 76%. In this model of the guide vanes, efficiency characteristics close to the basic level were obtained, and the head values increased significantly.

The last step of the research was the narrowing of the transfer and inlet channels of the guide vanes from 15 mm to 10 mm to build the correct axisymmetric flow in the meridional section of the guide vanes (model 04).

Analysis of the qualitative picture of the relative velocity distribution (Figure 14) proves the correctness of the guide vanes' design.

The distribution of fluid in the stage is qualitative. There are no zones of significantly reduced (blue color) and increased (red color) relative velocity in the intervane channels of the guide vanes.



(a) (b)

***Figure 12:** Qualitative picture of the distribution in the improved pump stage's flowing part (model 03): (a) total pressure; (b) relative velocity*

Table 5: Characteristics of the improved stage of the ECW 10-63-150 pump (model 03).

Duty Point	Flow Rate Q, m^3/h	Head / m	Efficiency, %
0.05	3.5	74.57	14.14
0.10	7.0	78.30	23.84
0.20	14	80.21	40.80
0.40	28	80.08	58.05
0.60	42	78.78	68.51
0.80	56	72.61	73.72
1.00	70	61.54	75.74
1.20	84	48.87	74.46
1.40	98	34.47	68.10
1.60	112	19.35	54.16

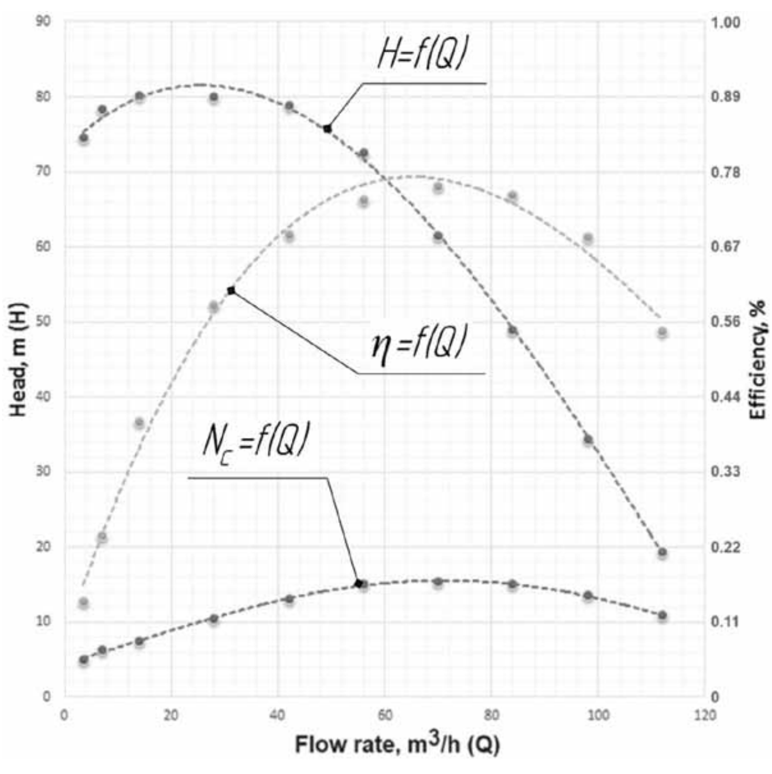


***Figure 13:** Characteristics of the improved stage of ECW 10-63-150 pump (model 03)*

In this stage model (model 04), there is an increase in both the head and the pump's efficiency (Table 6).

The operating point remained unchanged compared to the previous version (flow rate equal to 70 m^3/h), the head increased slightly to the value of 65 m, and thanks to the correctly designed guide vanes, a high efficiency level, about 80%, was achieved. The head characteristic (Figure 15) of the stage has a drop in the delivery range from 0 to 28 m^3/h, which does not affect the pump's performance because the standard regulates the possibility of operating the pump in the operation range of (0.7-1.2)·Q_{opt}[37].

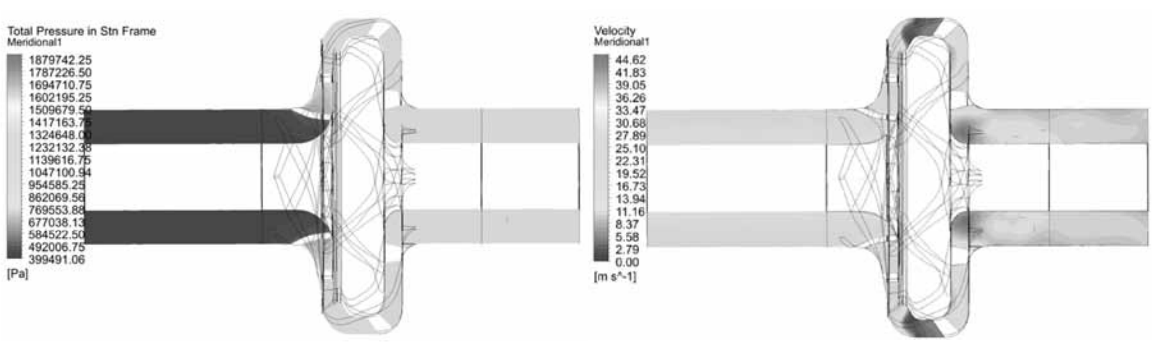
Based on the research results, the electric pump unit ECW 10-65-150 was developed, characterized by increased energy efficiency indicators and head characteristics concerning existing analogs (Table 7).

4. Discussion

Given the obtained results, a significant increase in the head was achieved from 14.75 m of the basic stage to 65.04 m of the developed stage (model 04) of the pump, which is 440% more. Thus, the pump head, which is created by the flowing part with a basic stage (eight pieces), can be provided by a pump using only two designed stages (model 04) [38].

According to the research results, the pump's weight was reduced from 200 kg to 45 kg, or 77.5%.

The energy efficiency (nominal mode) of the developed stage (model 04) is the highest of all the studied stages



(a) (b)

***Figure 14:** Qualitative picture of the distribution in the improved pump stage's flowing part (model 04): (a) total pressure; (b) relative velocity*

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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

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Table 6: Characteristics of the improved stage of the ECW 10-63-150 pump (model 04).

Duty Point	Flow Rate Q, m^3/h	Head / m	Efficiency, %
0.05	3.5	76.22	15.88
0.10	7.0	79.75	25.61
0.20	14	82.30	41.85
0.40	28	83.88	60.46
0.60	42	83.73	72.52
0.80	56	76.79	77.62
1.00	70	65.04	79.42
1.20	84	51.52	77.85
1.40	98	36.83	72.51
1.60	112	20.49	56.81

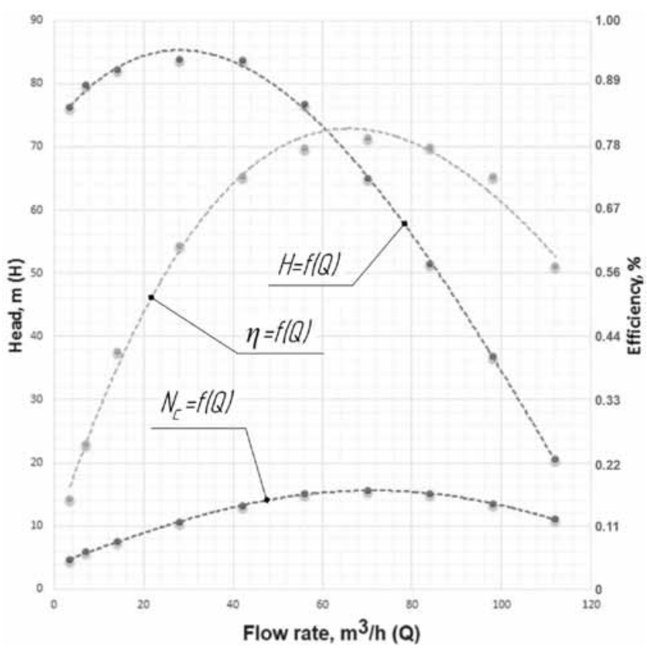

***Figure 15:** Characteristics of the improved stage of the ECW 10-63-150 pump (model 04)*

(79.42%). Also, it is 5% higher than that of the basic stage.

The power consumption (nominal mode) of the developed stage (models 03 and 04) is almost the same (15.56 kW and 15.62 kW, respectively). However, the head of the 04 model is 3.5 m (or 5.4%) higher than that of the 03 model.

The pictures of the relative velocity distribution in the intervane channels of the centrifugal impeller and the guide vanes (Figure 14b) prove the high quality of the design of the flowing part of the pump unit, the correctness of the installation angles of the blades, and the correct selection of their number (Figure 14a).

According to the calculations, the head characteristic of the stage was built (Figure 15), with the help of which we can see that the pressure at the calculation point Q = 70 m^3/h is 65 m, and the efficiency is 80%.

The standard[37] establishes the following requirements for the operation of pumping equipment. Short-term operation of the pumping equipment in the operating range Q = (0.7-1.2)·Q_{BEP} and long-term operation in supply modes Q = (0.9-1.1)·Q_{BEP} is allowed. In this case, the flow rate at Q_{BEP} means the mode of operation of the pump, in which the maximum value of efficiency η is reached.

For long-term operation of pumping equipment, we will obtain the following range from 63 m^3/h to 77 m^3/h. With such values, we can obtain such a range of the head and efficiency. At a point with a flow rate of 63 m^3/h, we will obtain a head of 71 m and an efficiency of 80%. At a point with a flow rate of 77 m^3/h, we will obtain a head of 59 m and an efficiency of 79%.

Table 7: Comparison of operating paramters of different stages of the developed pump

Parameter	Basic Stage Model	01	02	03	04
Flow rate, m^3/h (max efficiency mode)	65	28	84	70	70
Head, m (max efficiency mode)	14.75	106.31	47.96	61.54	65.04
Head, m (nominal mode)	14.75	9.04	45.67	61.54	65.04
Efficiency, % (max mode)	74.55	72.82	58.65	75.44	79.42
Efficiency, % (nominal mode)	74.55	10.60	51.77	75.44	79.42
Power consumption, W (max effieincy mode)	3504	11,139	18,718	15,560	15,621
Power consumption, W (nominal mode)	3504	–	17,824	15,560	15,621

For short-term operation of pumping equipment, we will obtain the following range from 49 m^3/h to 84 m^3/h. With such values, we can obtain such a range of the head and efficiency. At a point with a flow rate of 49 m^3/h, we will obtain a head of 80 m and an efficiency of 77%. At a point with a flow rate of 84 m^3/h, we will obtain a head of 22 m and an efficiency of 78%. Having obtained a good efficiency characteristic, we can increase the pump's operating range during its long-term operation.

Submersible pumps can differ depending on the depth of water's rise or the diameter of the well. The smaller the diameter of the welt the more stages need to be used to raise the liquid from the source, affecting the mass and dimensional parameters of the pumping unit.

Using this pump on all wells can increase uniformity, standardization, reliability, and the number of spare parts stored in the warehouse.

The main advantages of the research results are as follows. Firstly, an increase in efficiency of the developed pump by 4.87% compared to the existing analog has been achieved. Secondly, there is a 67.5% reduction in the weight and overall dimensions of the developed pump, which will lead to a significant reduction in the cost of the pump in comparison with an existing analog. Moreover, the use of the proposed approach made it possible to reduce the cost and prevent the need for manufacturing and full-scale testing of intermediate models of the developed pump (models 01, 02, and 03).

The limitation of the study is the need to replace pump elements, which requires additional investment costs for the modernization of already installed pumps.

Further studies will be aimed to prove the results of numerical studies by carrying out a full-scale test at the Laboratory of Hydrodynamic Drives and Installations. It is also planned to conduct a more in-depth study of the flow pattern in the flowing part of the developed pump stage model (model 04) and the integral characteristics of the pump based on it. It is also planned to manufacture and test the pump using the developed model of the pump stage (model 04).

5. Conclusions

During the research, the flowing part of the submersible pump for water intake stations was developed, and it was characterized by increased energy characteristics due to the increased frequency of the shaft rotation. The proposed structural scheme is fundamentally new for submersible pumps with a two-stage flowing part structural scheme.

Based on the developed design diagram of the ECW 10-65-150 pump, 3D models of the pump flowing part (impeller, guide vanes) and the liquid pumped were created in the SolidWorks software environment. Using the ANSYS CFX software complex, numerical research of hydrodynamic processes was performed in the 3D model of the elements of the developed pump's flowing part, which made it possible to obtain the maximum possible indicators of the pump's energy efficiency and ensure its increased head capacity due to the increased frequency of the shaft rotation. The stage parameters in the nominal operating mode are as follows: the flow rate equals Q = 70 m^3/h, the head is equal to H = 65.04 m, and efficiency is η = 79.42%.

Due to the increase in the rotation frequency of the rotor, a significant increase in the stage's head was achieved from 14.75 m (basic model) to 65.04 m (developed model 04), which creates the prerequisites for reducing the number of stages in the pump from eight pieces down to two pieces, as well as a significant reduction in material capacity from 200 kg to 45 kg, or by 67.5% of the pump.

From the point of view of energy efficiency, an increase in efficiency 11 compared to the existing analog (basic model) has been achieved by up to 4.87%, which will significantly reduce its energy consumption.

Introducing this pump to operate on water intakes will increase the unification and standardization of pumping equipment. In addition, it will reduce the cost of the life cycle of the pump installation based on the developed pump due to a significant reduction in investment costs and electricity costs during the pump operation compared to the base model.

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funding acquisition, I.P. All authors have read and agreed to the published version of the manuscript.

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RISE TN - WRI Meeting - 2nd Feb 2024

Resilient Inclusive and Sustainable Enterprises - Tamil Nadu Market Strategies & Project Opportunities for MSMEs in EV Sector was held on 2nd February 2024 in CODISSIA

President Sri. D. Vignesh attended the meeting and distributed Certificates to the participants in the skilling program.

Meeting with CEO of CSB Bank on 8th Feb 2024

President Sri. D. Vignesh along with other Industry Associations had a meeting with Shri. Pralay Mondal, Managing Director & CEO of CSB Bank Ltd., today to discuss about the requirements and expectations of MSME's from Banks, at Radisson Blu

DMK Meeting - Smt. Kanimozhi Karunanidhi's visit to Coimbatore – 10th February 2024

President Sri. D. Vignesh attended the event, Representation was given to Smt. Kanimozhi Karunanidhi on 10th February, 2024. Subject: Submission of Points for Election Manifesto.

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நம்பிக்கையுடன் செயல்படுங்கள்

சிந்தனைக் கவிஞர்
டாக்டர் கவிதாசன்
இயக்குனர் மற்றும் தலைவர்,
மனிதவள மேம்பாட்டுத் துறை
ரூட்ஸ் நிறுவனங்கள், கோவை

நம்பிக்கை உண்டானால் வெற்றியுண்டாகும். அந்த நம்பிக்கையின் மூலாதாரம் விடாமுயற்சி என்கிறார் மகாகவி பாரதியார். ஆகவே எதையும் நம்பிக்கையுடன் தொடங்குங்கள். ஏனென்றால் நம்பிக்கைதான் வாழ்க்கை. நம்பிக்கை என்கிற நந்தா விளக்கை இதயத்தில் ஏந்திச் செயல்படும்போது எடுத்த காரியம் யாவிலும் வெற்றி என்பது உறுதி. நம்பிக்கையும் விடாமுயற்சியும் கைகோர்த்துச் செயல்பட வேண்டும். சிலருக்கு நம்பிக்கை இருக்கும் ஆனால் விடாமுயற்சியுடன் செயல்பட மாட்டார்கள். சிறுசிறு தோல்விகள் நேர்ந்தாலும் மனம் சோர்ந்து முடங்கிவிடுவார்கள். இன்னும் சிலரோ விடாமல் முயல்வார்கள் ஆனால் ‘முடியும்’ என்ற நம்பிக்கை இருக்காது. நம்பிக்கையில்லாமல் முயல்வது என்பது, இருட்டு அறையில் கருப்புப் பூனையை பிடிக்க முயல்வதற்கு ஒப்பாகும்.

ஆகவே எப்பொழுதும் முழுமையானநம்பிக்கையுடன் விடாமுயற்சியுடன் செயல் படுவதை உங்களுடைய மனப் பழக்கமாக்கிக் கொள்ளுங்கள். முடிந்தவரை முயல்வதல்ல முயற்சி எடுத்ததை முடிக்கும்வரை முயல்வதுதான் முயற்சி என்பதையும் புரிந்து கொண்டு வெல்லும் வரை முயல்வேன் என உறுதியேற்றுக் கொண்டு முயலுங்கள். வெற்றி உறுதி.

பொறுமையுடன் முயலுங்கள்

ஒரு நிமிடப் பொறுமை வாழ்க்கைக்கே பொறுமை. அவசரப்படுவதால் எதையும் சாதித்து விட முடியாது. சிக்கலான சமயங்களில் பொறுமையாகச்செயல்படுவது மிகவும் முக்கியம். எதற்கும் ஒரு காலம் உண்டு என்பார்கள். காலம் கனியும் வரை காத்திருப்பதுடன் எதையும் உரிய காலத்தில் செய்து முடிப்பதும் முக்கியம். இதைத் தான் ‘ஞாலம் கருதினுங் கைக்கூடுங் காலம் கருதி இடந்தாற் செயின்’ என்கிறார் திருவள்ளுவர்.

துணிவுடன் முயலுங்கள்

தோல்வி நேர்ந்தாலும் துன்பம் சூழ்ந்தாலும் மனம் தளர்ந்து விடாமல் துணிவுடன் முயல்பவர்களே வெற்றிக் கனியைச் சுவைக்கிறார்கள். தோல்வி கண்டு பின்வாங்குபவர்கள் எப்பொழுதும் முன்னேற்றக் காற்றை சுவாசிப்பதில்லை. தோல்வி நேர்ந்தால் நீங்கள் வெல்வதற்குத் தகுதியற்றவர்கள் என்று அர்த்தமல்ல, நீங்கள் மேற்கொண்ட வழிகளில் அணுகுமுறைகளும் முயற்சி களும் போதுமானதாகவும் சரியானதாகவும் இல்லை என்றுதான் அர்த்தம். ஆகவே வழிகளையும் முறைகளையும் மாற்ற வேண்டுமே தவிர முயற்சிகளைக் கைவிடக் கூடாது.

தோல்வி நேர்ந்தால் நீங்கள் வெல்வதற்குத் தகுதியற்றவர்கள் என்று அர்த்தமல்ல, நீங்கள் மேற்கொண்ட வழிகளில் அணுகுமுறைகளும் முயற்சிகளும் போதுமானதாகவும் சரியானதாகவும் இல்லை என்றுதான் அர்த்தம்.

கிரிக்கெட் மைதானத்தில் துணிவு என்பது விக்கெட் களை வீழ்த்துவதோ அல்லது

ரன்களை எடுப்பதோ மட்டுமல்ல, என்பதற்கு எடுத்துக்காட்டாகத் திகழ்ந்தவர் அனில்கும்ளே. 2002ம் ஆண்டு மேற்கிந்தியத் தீவுகள் அணிக்கு எதிராக ஆண்டிகுவா மைதானத்தில் ஐந்துநாள் போட்டி நடைபெற்றது. அதில் விளையாடிய அனில்கும்ளே பேட்டிங் செய்யும்போது மேற்கிந்தியத் திவுகள் பந்துவீச்சில் தாடையில் பலத்த காயம் ஏற்பட்டு ரத்தம் கொட்டியது. எக்ஸ்ரே எடுத்துப் பார்த்ததில் தாடை எலும்பு முறிந்திருப்பது தெரிய வந்தது. உடனடியாக அறுவைச் சிகிச்சை செய்யவேண்டும் என்று கூறினார்கள். ஆனால் இடைவேளைக்குப்பிறகு தாடையில் கட்டுப் போட்டுக் கொண்டு மைதானத்திற்கு வந்துவிட்டார் கும்ளே. அந்த நிலையிலும் தொடர்ச்சியாக 14 ஓவர்கள் பந்து வீசி மேற்கிந்திய அணியின் முக்கிய வீரர் லாராவை அவுட்டாக்கினார். போட்டி யாருக்கும் வெற்றி தோல்வியின்றி டிராவில் முடிந்தது.

அடுத்த நாள் ஆபரேசனுக்கு சென்றபோது 'நான் என்னால் முடிந்ததைச் செய்ய முயன்றேன் என்ற திருப்தியுடன் இப்போது சிகிச்சை செய்து கொள்கிறேன்' என்றார் கும்ளே. அத்தகையை முயற்சியே துணிவுடன் முயல்வதற்கு அடையாளம். இதையே வள்ளுவரும் 'துன்பம் உரிவரினும் செய்யக துணிவாற்றி இன்பம் பயக்கும் வினை' என்கிறார்.

அச்சமின்றி முயலுங்கள்

உன்னத இலட்சியத்தை நோக்கி முயலும் போது எள்ளளவும் அச்சமின்றி துணிவுடன் முயற்சிக்க வேண்டும். சிறிதளவு அச்சம் நெஞ்சில் இருந்தாலும், முயற்சியில் மனம் முழுமையாக ஈடுபடாது. ஆகவே அச்சத்தை அடியோடு மனதிலிருந்து விரட்டியடிக்க வேண்டும். 'அச்சமில்லை அச்சமில்லை உச்சி மீது வானிடிந்து வீழ்ந்தபோதும் அச்சமில்லை அச்சமில்லை' என்று ஊக்கமூட்டுகிறார் மகாகவி பாரதி. ஆகவே அச்சமில்லாத முயற்சியே வெற்றிக்கு அடித்தளமாக அமைகிறது.

வாழ்வில் எத்தனை தோல்விகள் நேர்ந்தாலும் அச்சமின்றி முயற்சிக்க வேண்டும் என்பதற்கு உதாரணம் ஆபிரகாம் லிங்கனின் வாழ்க்கை. தனது ஏழு வயதில் குடும்பத்தின் வறுமை காரணமாக வேலைக்கு போனார். 9வயதில் தனது தாயைப் பறிகொடுத்தார். 22 வயதில் கடையில் கிளார்க்காக வேலைக்குச் சேர்ந்தார். 23 வயதில் மாகாண சபை தேர்தலில் தோற்றார். 24வயதில் தான் ஆரம்பித்த வியாபாரத்திலும் தோற்றார். 25 வயதில் மாகாண சபை தேர்தலில் முதல் வெற்றி கிடைத்தது. 27வயதில் நரம்பு நோய் பாதித்தது. 28வயதில் அவர் விரும்பிய பெண் அவரைத் திருமணம் செய்து கொள்ள மறுத்தார். 29வயதில் சபாநாயகர் தேர்தலில் தோல்வி. 31 வயதில் மீண்டும் தோல்வி. 34 வயதில் பிரதிநிதிகள் சபைக்கான தேர்தலில் தோல்வி. 41 வயதில் மகளை இழந்தார். 46 வயதில் அமெரிக்க செனட் சபை தேர்தலில் தோற்றார். 47வயதில் அமெரிக்கா துணை ஜனாதிபதி வேட்பாளர் ஆக முயன்று தோற்றார். 49 வயதில் மீண்டும் செனட் தேர்தலில் தோற்றார். இத்தனை அடுக்கடுக்கான தோல்விகளுக்குப் பிறகு அச்சமின்றி தொடர்ந்து முயன்று கொண்டே இருந்ததன் காரணமாக தனது 51வயதில் தேர்தலில் வென்று அமெரிக்க அதிபர் ஆனார். தோல்விகளைக் கண்டு துவண்டு பின்வாங்க நினைப்பவர்கள், லிங்கனை முன்னுதாரணமாகக் கொண்டு முயன்று முன்னேற்றப் படிகளில் தொடர்ந்து பயணிக்க வேண்டும்.

பன்முகமாக முயலுங்கள்

சாதாரண மனிதன் பலமுறை முயல்கிறான்; சாதனை மனிதன் பலவழிகளில் முயல்கிறான். மேலும், முயற்சி என்பது முன்னேற்றத்துடன் கூடியதாக இருக்கவேண்டும். ஒவ்வொரு முறை முயலும்போதும் கூடுதல் வலிமையுடனும், தெளிந்த விவேகத்துடனும் முயற்சிக்க வேண்டும்.

எதையும் ஆழ்ந்து சிந்தித்துத் தெளிந்த பின்னரே முயற்சிகளை மேற்கொள்ள வேண்டும். இதைத்தான் வள்ளுவர் "எண்ணித் துணிக" என்கிறார். நமது இலக்குத் தெளிவாக இருக்க வேண்டும் என்பதுடன், அது அனைவருக்கும் நன்மை கொடுக்கக் கூடியதாகவும் இருக்க வேண்டும் என்பது மிகவும் அவசியம். ஏனென்றால் அனைவருக்கும் நன்மைதரும் இலக்குக்கு வலிமை அதிகம். நாம் முன்னேற வேண்டும் என்று நினைப்பதுடன் அவ்வாறு முன்னேறுவதால் சமுதாயமும் நாடும் பயன்பட வேண்டும் என்று எண்ணிச் செயல்பட வேண்டும். இதை மகாகவி பாரதியும் வலியுறுத்துகிறார் "மண் பயனுற வேண்டும்" என்று. ஆகவே நல்ல இலட்சியத்தை நோக்கி நம்பிக்கையுடனும் துணிவுடனும் முயற்சிக்கும் போது எடுத்த காரியம் யாவிலும் வெற்றி என்பது உறுதி.

What the Media says?


தினமலர்

வாக்குறுதிகளை நிறைவேற்றாமல் போனதற்கு என்ன காரணம்

தி.மு.க., - எம்.பி., கனிமொழி விளக்கம்

Dinamalar 11th Feb 2024

Visit of Dr. Vinod Tare - Meeting was organised by Siruthuli

Dr Vinod Tare, Founding Head of cGanga and Professor at IIT Kanpur, visited Siruthuli on 3rd February, 2024. He was received at Noyyal Life Centre by Siruthuli Team. After lunch, a brief presentation was made on the salient features of the Noyyal River System and the issues of sewage plaguing the system at various points.

He, along with the team then left to visit the locations where Decentralised STPs are proposed to be installed.

The first location was the point where Coimbatore Vaaikkaal enters Periakulam. There is a STP in operation on the southern side of the channel. Of the 10 mld of sewage that the lake receives, 4 mld is treated and let into lagoons, the surplus from where flows into the lake. The area opposite the existing STP to the north of the channel was found to be ideal. Dr Tare suggested that treated water from the proposed STP should be identifiable, so that results can be clearly observed. In that case, it was decided that a separate small lagoon be created in the available space and also that aquaculture be introduced in it.

The second location was the stream flowing in Sundapalayam. The space adjacent to the stream in front of Vallalaar Diawound Hospital looked appropriate. A retaining wall will have to be constructed along this space. A check dam will have to be constructed to retain the sewage, from where it can be pumped up for treatment. Vice President of Save Agriculture Association was also present. Part of the treated water can be let along the stream and the remaining distributed to the farms in the vicinity.

An interaction was arranged at NLC with Dr Vinod Tare. Officials from the Coimbatore Municipal Corporation, Tamil Nadu Pollution Control Board, SiTarc, Siema and members from the Apex Committee of Siruthuli participated.

Dr Tare spoke at length about the origin and the objectives of River Systems that has continued to evolve over the years. Dr Tare emphasized the concept of Scientific Decentralized Sewage Treatment methods and illustrating the river's

inherent ability to remain intact and serve humanity. He advocated for the preservation of the river's flow, emphasizing the need to leave some water for the river's well-being.

Underlining the success of these initiatives, Dr Tare informed that the Government of India has now embarked on projects to address water challenges in other river basins, including Narmada, Kaveri, and Mandakini. These projects, backed by a high critical mass, signal a promising future for sustainable water management.

He emphasized the need to leverage joint efforts for transforming rivers into catalysts for urban water management. He highlighted the pollution abatement, effective river basin management, and the enhancement of people-river connectivity and biodiversity.

He explained in detail, various aspects of the STP demonstrated Sequential Continuous Flow Reactor. He emphasized the advantages of having low power consumption, low space requirement and continuous operation of the system. He encouraged questions from the audience and answered them in detail.

An appeal was made to him that the technology be made available to industrialists in Coimbatore so that manufacturing can be taken up here.

The idea of organising a Conclave on Decentralised STPs at Coimbatore was discussed and Dr Tare assured the gathering that he will bring distinguished professors from IITs and NITs to participate.

Ms Vanitha Mohan, Managing Trustee thanked Dr Vinod Tare for taking time and coming to Coimbatore to help us understand the process for sewage treatment and also requested him to help in installing a Decentralised STP in this part of the country.

Data about the sewage flow in the specified sewage channels taken on 13th February 2024, in Coimbatore:

S.No.	Name of the Channel	Co-ordinates	Flow in (litres/hr)	Flow in (litres/day)	MLD
1.	Periakulam inlet (North)	10.591169, 76.571327	389790	9354960	9.35
2.	Sewage stream near Fun Mall	11.12359, 77.03706	703764	16890336	16.89
3.	Sewage stream near Airport	11.21970, 77.23544	631843.5	15164244	15.16