**Manufacture of Cylinder Block for RC Solution Feed Pump**

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**Outcome from the R&D Project**

* The research and development project conducted at BITAC aimed to design and manufacture cylinder block for RC Solution Feed Pump from stainless-steel scrap and ferro-alloy available in Bangladesh. Throughout the project, extensive research, experimentation, and analysis were carried out to understand the feasibility and potential benefits of utilizing stainless-steel scrap and ferro-alloy as a raw material for cylinder block manufacture.
* The project successfully achieved its objectives by developing a systematic procedure for transforming stainless-steel scrap and ferro-alloy, which involved specific steps such as scrap selection, estimation, melting using induction melting furnace & alloying, sand mold making, casting, chemical elements analysis by wet process and optical emission spectroscopy(OES), heat treatment to homogenize the structure, machining and stress relieving by heat treatment, defects identification by non-destructive testing (NDT) and microscopic analysis. This procedure demonstrated promising results in terms of producing cylinder block with desirable properties such as improved tensile strength, hardness, wear resistance, corrosion resistance and impact resistance.
* The findings of this design and development project have significant implications for the manufacturing industry in Bangladesh. By utilizing stainless-steel scrap and ferro-alloy which are abundantly available, the country can reduce its dependency on expensive imported block. This can lead to cost savings, resource conservation, and improved sustainability in the long run.
* Furthermore, the project contributes to the overall advancement of material science and engineering by expanding the understanding of cylinder block manufacturing techniques and highlighting the potential of stainless-steel scrap as a viable raw material. The established procedure can serve as a valuable reference for researchers, engineers, and industry professionals involved in the manufacture of import substitute.

**Recommendation**

**1. Large-Scale Implementation**

* Scale-up the developed procedure for cylinder block manufacturing from stainless-steel scrap involving our local foundries.
* Develop a roadmap for large-scale adaption of this process by local foundries. This could involve collaboration with academia, BITAC and local foundries to create awareness, training programs, and potential technology transfer.

**2. Further Exploration**

* Conduct further research and development efforts to optimize the process, fine-tune the parameters, and ensure scalability and commercial viability.
* Investigate the suitability of cylinder block for a wider range of industrial applications especially fertilizer factories.
* Explore the potential use of different types of stainless-steel scrap as raw materials.
* Conduct life-cycle assessments to compare the environmental impact of cylinder block manufacturing from stainless-steel scrap and ferro-alloy.

**Justification**

The project's findings present a significant opportunity for the Bangladeshi foundry industries. Utilizing readily available stainless-steel scrap for cylinder block production offers several advantages.

* **Reduced Reliance on Imports:** Decreases dependence on expensive imported substitutes.
* **Cost Savings:** Lower production costs due to the use of local scrap stainless steel.
* **Resource Conservation:** Promotes resource efficiency by utilizing waste materials.
* **Material Science Advancement:** Contributes to the development of new material science and engineering knowledge.

By implementing these recommendations, Bangladesh can establish itself as a leader in sustainable cylinder block manufacturing, fostering economic growth and environmental responsibility.