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NASENI

28/10/2025

NASENI RESEARCH COMMERCIALIZATION GRANT PROGRAM (NRCGP)
National Agency for Science and Engineering Infrastructure

Dear Review Committee,

I want to allign with this grant application submitted by our team from the Scientific Equipment Development Institute(SEDI) Enugu, for the commercialization of the "**Evaluation of False Wall Fruit Oil(FWFO)-Canarium Schweinfurthii- as a medium in the austempering Process of Ductile Cast Iron**" . The False Wall Fruit Oil was obtained through a mechanical extraction process, where the raw material oil was harnessed without the application of any known solvent extraction method. The ductile cast iron chemical compositions(Control) and the rest tests samples(Cast iron-vanadium/Cast iron-molybdenium) together with the oil physio-chemical characteristics compositions were recorded and used for this study.

The oil physio-chemical characteristics recorded a high flash point which is one the main determinants in the austempering process. Two different elements (molybdenum and vanadium) were alloyed with the ductile cast iron prior to the austempering heat treatment. The cooling curve and cooling rate of the FWFO were also determined using a stainless steel temperature probe.

The processing parameters used were: austenitizing temperature at 920°C, holding time for 1 hour, austempering temperature at 290°C (lower bainite) at various austempering times of (1 – 4hrs) both in the oil and salt baths media for comparisons.

Mechanical property tests (tensile strength, elongation, hardness, and impact energy) of the austempered ductile cast iron were greatly improved. The optimum properties were obtained between 2.5 – 3 hours, which was the processing window for the ductile cast iron material. The false wall fruit oil which was investigated showed an excellent property and reacted at the processing window which was narrower than the standard salt bath. The mechanical property tests were at its optimum at 3 hours austempering time in the oil bath, as there was improved ductility and toughness and slightly reduction in the tensile strength and hardness which was dependent on the area of application of the austempered ductile cast iron.

The study confirmed that the addition of vanadium(0.15 wt %) and 0.3 wt % of molybdenum, recorded the highest ductility and impact toughness values. In addidtion, this was also recorded in the standard salt bath with additions of the aforementioned values.

The micro-structure consisted of graphite nodules surrounded by acicular(needle-like) ferrite and high carbon enriched content in austenite called "ausferrite".
This innovation has the potential to revolutionize industrial hub and economic impact to the Nation's development.

I hereby endorse this grant application, confirming that SEDI Enugu has the necessary infrastructure and expertise to support the commercialization of the Evaluation of False Wall Fruit Oil (FWFO) in the Austempering process of Ductile Cast Iron.
We are confident that this project will contribute significantly to the growth of our Nation and the Society at large in line with the **Renewed Hope Agenda of Mr. President.**

Sir, do not hesitate to contact me should you have need for any additional information.
Yours Sincerely,

Engr. Dr. Nwonye, Emmanuel I.
Special Assistant(Technical) to the Acting MD/CE SEDI- Enugu.