Laser transmission welding of polypropylene composites:

Mechanical and Morphological characterisation of lap-joint

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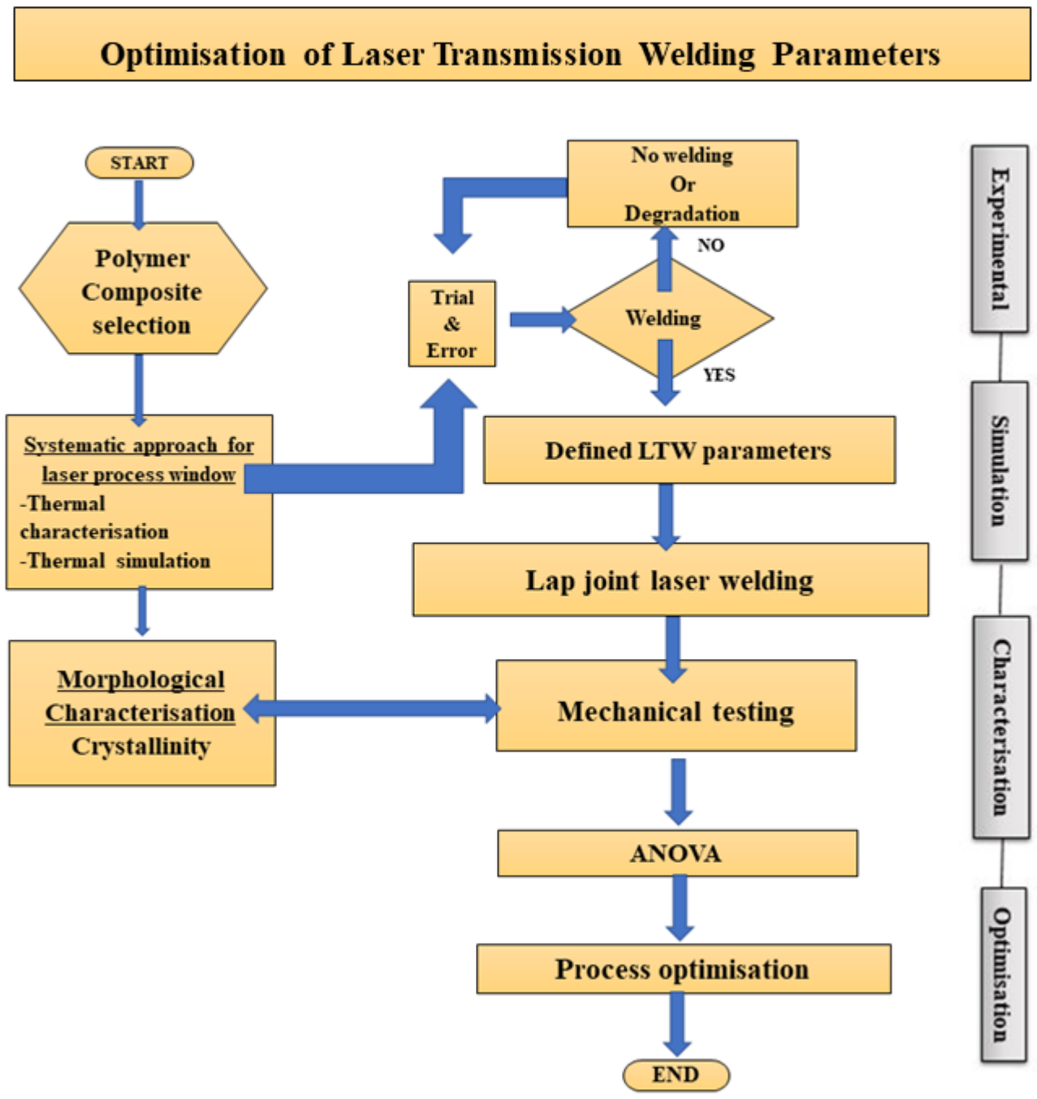
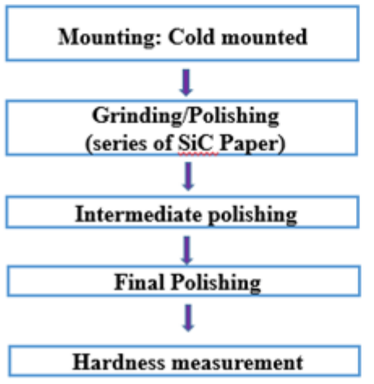


- LTW trials were performed using a diode laser by considering laser power and welding speed at a given spot diameter and clamping force.
- Carbon black plays a significant role in LTW along with laser welding process parameters[1].
- Neat polypropylene (PP) was welded with CB composite containing 0.5 wt.% and 1 wt.% CB at line energies of 0.06 J/mm and 0.12 J/mm each
- To systematically reduce the number of trial and error, a thermal simulation was carried out along with the thermal characterisation of the polymer and its composites
- This allows the joining technique of LTW to move beyond trial-and-error methods to robust analytical methods.
- Through microscopic inspections and mechanical lap shear tests, the quality of the weld joints was analysed in terms of the laser process parameters
- The lap shear strength of the PP samples welded at 0.12 J/mm was higher compared to 0.06 J/mm
- The crystallinity and crystalline microstructure greatly influenced the properties of PP and its CB composites[2,3]. With an increase in line energy and percentage of CB content, there was an increase in the PP crystallinity.

Future Work
Moulding and Polishing of welded cross-section as per Buehler's Recommendation
Vickers hardness measurements
(UU collaboration)



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References:
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