

Wire Arc Additive Manufacturing for Industrial Part Fabrication: A Short Review

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INTRODUCTION & AIM

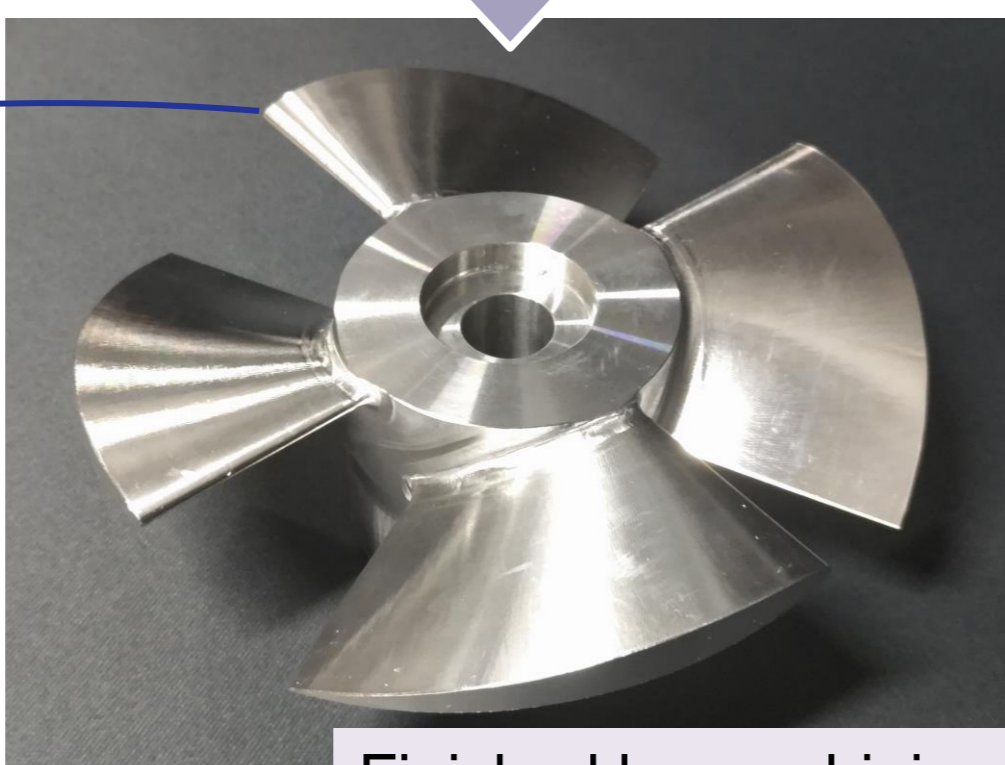
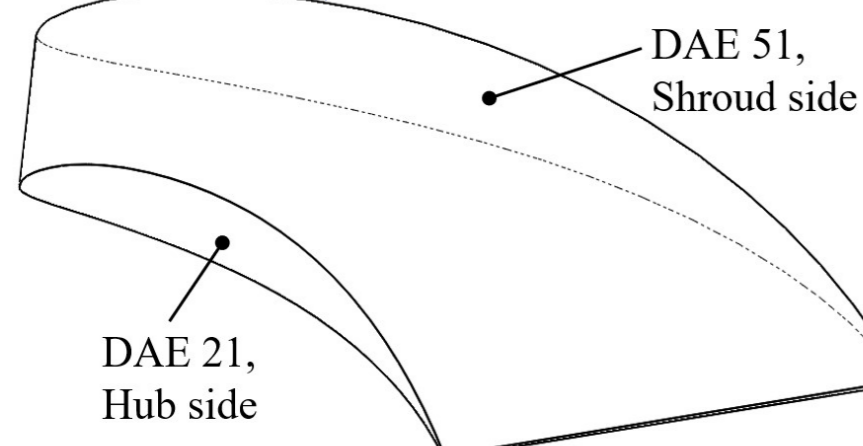
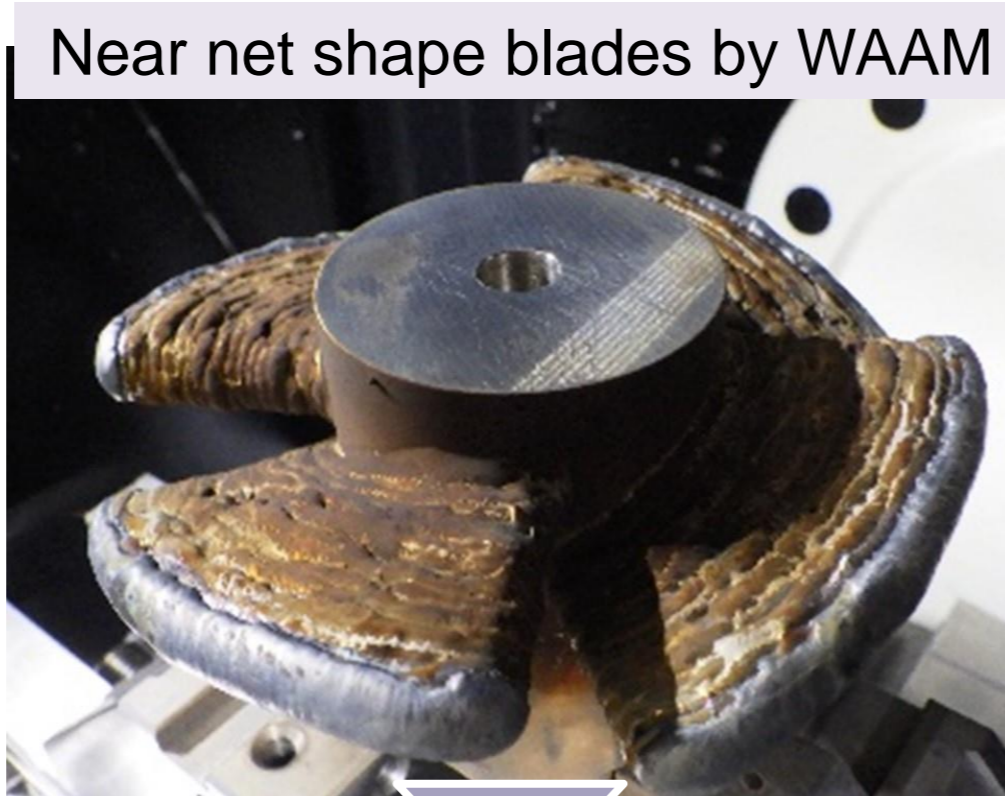
Large parts with complex shapes are suitable for wire arc additive manufacturing (WAAM), an additive manufacturing technique based on arc welding, which is classified as directed energy deposition. Studies on WAAM are being conducted from various approaches, including mechanical properties, heat input conditions, material microstructures, and development of hybrid systems with machining. On the other hand, many of these studies are evaluations using simple shape specimens. However, WAAM as a fabrication technology requires various evaluations using actual part shapes used in industry as test pieces to lead to its industrial applications.

This review surveys studies on WAAM with industrial parts to summarize the current state. Based on the results, the future of research on WAAM using industrial parts is discussed.

Simple shape



Complex shape



Ejiri, S., *Turbomachinery* **2024**, 52-6, 367-373. (in Japanese)

METHOD

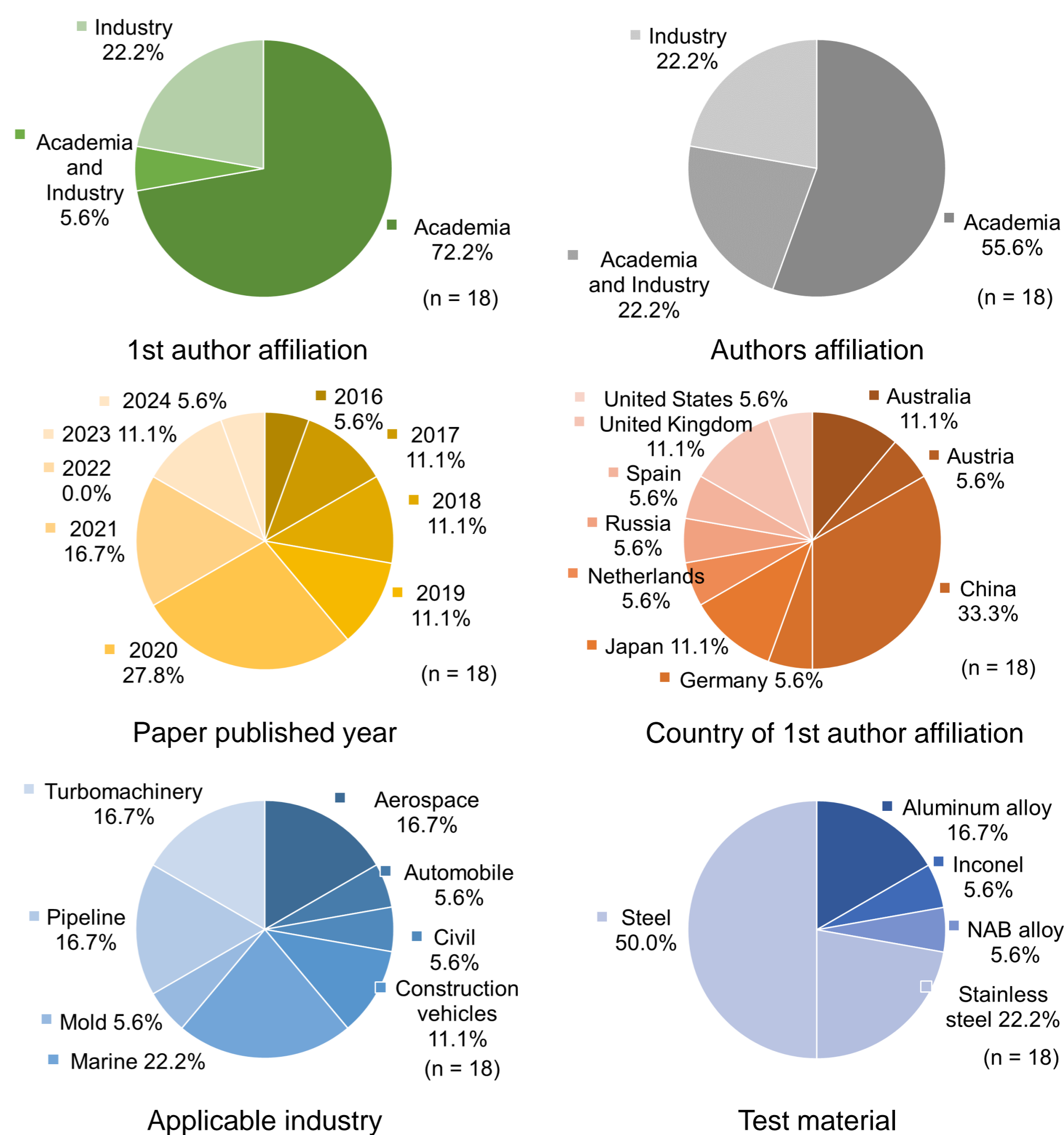
Literature review on studies with Industrial parts by WAAM Language: English only

- ◆ Scope of this survey
 - Peer-reviewed original articles
 - Peer-reviewed proceedings
- ◆ Outside scope of this survey
 - Non-peer-reviewed original articles
 - Non-peer-reviewed proceedings
 - Review articles
 - Preprints
 - Books
 - Commercial magazines
 - Commercial documents such as white papers
 - Web sites

Studies with simple shaped specimens are not covered.

Not covered to remove as much commercial bias as possible.

RESULTS & DISCUSSION



- ◆ Over half of the studies are in academia, but industry is also conducting studies for social implementation.
- ◆ Studies on industrial parts are continuously conducted.
- ◆ The studies of WAAM for industrial parts have been conducted in countries included in the regions of Asia, Europe, North America, and Oceania. Not found any studies in countries included in the regions of South America and Africa in this survey.
- ◆ Studies are being conducted to target various industries.
- ◆ Over half of the studies were conducted about steel and only found studies for WAAM with a single material.

Next Challenges

Some of the examples that were not found in this survey but have been studied in simple shaped specimens fabricated WAAM include the following.

- ◆ High-cost materials such as titanium alloy
- ◆ Multi-materials including composites

These study results may expand the range of industrial applications of WAAM.

CONCLUSION

WAAM has the potential to further develop into a technology that will be one of the key factors to achieve industrial innovation.