

CT-77, Development of Hard-Soft Coatings for Enhanced Machining Performance Employing Large Area Filtered Arc Deposition Technique.

In this project we propose to demonstrate significant improvement in machining performance of machine tools by developing a graded coating architecture viz. hard/hard-soft/soft employing LAFAD system available at UES. Process parameters such as chemical and plasma (sputter) cleaning, gas pressure, substrate temperature and bias will be optimized in terms of coating characteristics such as hardness, adhesion, friction and wear. The validation of the optimized coating architecture will be demonstrated by its performance evaluation in various machining operations.

- The specific objectives can be enumerated as follows:
- Develop and optimize chemical and plasma cleaning procedure for cutting tools.
- Deposit hard coatings with optimized cleaning procedures and demonstrate its effectiveness in machining operation.
- Determine and optimize deposition conditions for graded coating (hard-soft) and demonstrate its effectiveness in machining operation.
- Demonstrate the effectiveness of the proposed coating architecture in various machining applications.

Further coating optimization work in relation to specific applications will be conducted in Phase II. Also in Phase II detailed failure analysis of the coating will be done. Following Phase II program we expect to fully commercialize the proposed technology.

Since the proposed project consists of the development of an innovative coating scheme (a materials technology) employing a patented processing technology, the objective of this project is in accordance with the EMTEC goal. Moreover, since the development and commercialization of the proposed project will be conducted in a unified effort with industry, academia and government, it also satisfies the EMTEC mission.

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