**Issue**

Inaccurate prediction or estimate the manufacturability of a part.

**Background**

Teams from past projects have found it difficult to foresee the manufacturability of parts without spending an unreasonable amount of time investigating. The result of many unknown variables like machine time, difficulty, and risk could result in the misallocation of funds, missed schedule milestones, or unacceptable quality standards. Additionally, teams have no method to determine with the workload on MERC’s shop. The absence of predicting the extent of the work a part needs results in huge fluctuations in workload, going from too much for the four current personnel to handle to barely enough to keep two personnel busy. Without knowing the range of variables about each part, tough decisions like subcontracting work because MERC’s shop is overloaded are difficult to make. This is because team leaders do not have the information readily available to make these decisions.

**Ideal Solution**

An ideal solution would take input information about the part in question and use artificial intelligence, machine learning, a mathematic model to assess the part’s overall machineability by predicting the time, difficulty, and risk. This solution should be able to accept at least one 3D file type (e.g., .step, .stl, .igus, .sldprt) in conjunction with additional information about the part. The system could be the form of a website or an app.

**Supporting Data**

There’s supporting data from experience and from fundamental design for manufacturing principles to assist these predictions.

* Past jobs- taking outcomes of hundreds of previous jobs can help assist future predictions.
* Design rules- these are ratios, tolerances, or features that greatly influence the manufacturability.
* Machine Setup- the overall capacity of the equipment at MERC and how the part is placed in the CNC influence or other equipment the time and quality of the part.
* Material- the material of the part plays a big role in the approach to machining.
* SolidWorks Add-ins – various manufacturability and reporting options available with SolidWorks or via add-in modules. CAM information can also be used.

**Outcomes**

Solving this issue will greatly improve confidence in project budgets, allowing expensive or high precision parts to be accounted for. Other planning aspects would improve like ensuring experienced personnel are brought in when needed. Additionally, the ability to compare MERC’s shop capabilities with the part’s technical requirements would be a significant achievement. Team leaders will be making decisions based on analytics and data throughout the course of a project. Having the basic knowledge of a part’s manufacturability can help even out the workload on MERC’s shop and keep projects under budget and on schedule.

**Information to be Provided**

MERC will layout a full list of desired output results. For example, rating the difficulty on a scale of 1 to 10. MERC will provide all supporting data. Sample parts/drawings can also be made available for reference.

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