# # 1. Narrative Charter Statement:

## Project purpose or justification

To design and manufacture low cost CNC Gas Cutting machine to replace manual cutting method of metal sheets by the computerized ones. The significance of the project is that it will provide accurate and precise cutting techniques to the professional workers at cheaper rates and it will save the time of the workers.

## Measurable project objectives and related success criteria

The objectives to be achieved and their success criteria is as follows:

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| **Objective** | **Success Criteria** |
| The objective of the project is to design and manufacture CNC Gas Cutting Machine within the budget of $600. | 1. The project expenditures are not be more than $600. 2. The final design has a work area of 5\*5 ft. 3. The table must be able to hold up to 3000 kg of load. |
| The project should be completed within 60 days and should be launched on 30 October 2020. | 1. The project is completed within and 60 days and is ready to be launched on 30th October 2020. 2. The Electronics components should be completed in 1 month. 3. All the components should be procured within 1 month. |
| The machine should have a cutting accuracy of 0.2 in. ± 0.005 in. | 1. The cutting accuracy of the final design is within the tolerances defined i.e. 0.2 in. ± 0.005 in. 2. The maximum table deformation should not be more than 1 in. 3. The Gantry movement must have an accuracy of at least 0.03 in. |

## High-level requirements

The requirements from the project are as follows:

1. The machine reduces the time taken in cutting metal sheets.
2. It maintains the accuracy of cutting which is difficult to manage using manual cutting methods.
3. It reduces the dependence on the workers as machine only requires one worker to operate the machine.
4. It is portable and occupies less space, so it is easy to move it from one place to the other.

## Assumptions and constraints

The assumptions and constraints related to the project are as follows:

1. To reduce the cost the material bought for the design of the machine will be local.
2. The design of the machine will be able to bear the load of the 5\*5 ft. metal sheet.
3. A factor of safety of 2 is used in the design.

## High-level risks

The risks associated with the project are as follows:

1. The material of the machine could be damaged by corrosion. To avoid this risk the materials used in the manufacturing are corrosion resistant and are further coated with paint to provide better resistance towards corrosion.
2. The machine might not be able to bear the weight of the sheet put on it if it is heavier than expected. To avoid this risk factor of safety is considered in the design.
3. The machine might not be able to provide the cutting accuracy of 0.2 in. that’s why the tolerance is included in the cutting accuracy.
4. The electrical components of the machine might be subjected to noise (electrical interference). To avoid this risk proper noise proofing of the electrical components will be done.

## Summary milestone schedule

The project should be completed in 60 days. The milestone schedule of the project is as follows:

1. The conceptual design should be completed in first 5 days.
2. The CAD model of the machine should be completed in the next 5 days.
3. All the procurement should be done between day number 11 and 15.
4. Mechanical assembly must be completed between day number 16 and 35.
5. Electrical assembly must be completed between day number 36 and 50.
6. Complete design and testing must be done in the last ten days.

## Summary budget

The summary of the budget is as follows:

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| **Items** | **Cost** |
| Steel Pipes for table design | $60 |
| Metal sheet for tabletop | $40 |
| Equipment for rotating assembly | $100 |
| Electrical components | $100 |
| Machining costs | $50 |
| Labor costs | $150 |
| Misc. costs | $100 |
| Total | $600 |