

Diploma Thesis Review

DT Author : Sakhti Sai Thamizhchelvan

DT Title: Design of the Suction Table for Plasma and Oxy-Fuel CNC Cutting Machine

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The Diploma Thesis describes a design of suction tables for VANAD s.r.o. company. As the gantry mechanism of such CNC machine varies, the suction table should be modular to cover different axes lengths. Nowadays the company buys the tables manufactured by another companies but they would like to have their own solution. This thesis should help them to find the right one.

The text is divided into two basic parts: theoretical analysis and practical solution development.

Theoretical part:

The theoretical part starts with the description of a need to suck out the smoke and fume exhausting from the cutting process. The main reason is to protect the workers from carcinogenic emission (hexavalent chrome element).

The second chapter gives the general picture of machine range produced by VANAD s.r.o. company – their three main product ranges.

The third chapter covers four main principles of capturing cutting process emissions. The exhaust table is selected as the best solution from the point of view of design, efficiency and cost (both primary investment and maintenance) effectiveness. This result is presented shortly in the chapter four.

The fifth chapter introduces some market well-known products from the manufacturers Tama, Tigemma, Kemper and Vicon.

Design part:

Design part starts with chapter six. At first, the assembly is divided into four subassemblies: basic frame, bucket, mesh and slat frame.

The most important is the first subassembly that consists (beside other things) of exhaust vents and air flow shut-off flaps. The acting of the mechanism is designed using mechanical and pneumatic elements.

Separators serve as a divider between the modules. It is a simple part made with welding of iron plates.

Buckets (following above) are modular again. They are used to keep process contaminants. As the filter on the top of the bucket there is used a mesh. The most top part is a frame with slats.

Chapter seven gives a short consideration about the possible activation/deactivation of the exhaust flaps based on the position of the machine cutting head. Author has selected a pneumatic operation.

This pneumatic scheme is described in the chapter eight.

Summary

The thesis is well structured and formally shaped. I can only have an objection in usage of imperial units (inches, PSI) in some chapters. Also capacity of the CNC machine given in amperes (that is a unit for electric current) is a little bit confusing for the readers.

In my opinion very large part of the text is dedicated to the description of very simple pneumatic mechanism. On the other hand a reader can doubt about the device efficiency. The air flow, that is the main force to suck the emission is somehow expected (maybe from practical experience with similar products). Some simulation using CAD/CAE tools should be very suitable in this case to predict the success of the design.

I mean student has presented a good knowledge and skills and I recommend this thesis for the presentation at the state committee.

Questions:

- 1) How can be predicted the direction of the air flow sucking the emission ? Especially in the center of the bucket ?
- 2) How flaps are sealed in the closed position ?

Review Author:

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Diploma thesis evaluation

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Presented by Mr. Sakhti Sai Thamizhchelvan

I rate as „good“

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