

Laser cutting extraction system guideline – Air filter

鐳射切割機排煙系統-空氣濾清器



2/8/2017

adidas[®]

GROUP

Purpose of this document 目的說明



The purpose of this document is to provide an update to adidas footwear suppliers about a satisfactory air filter which is necessary to extraction system of laser cutting.

Laser cutting transforms material from solid to sublimation state, creating GAS and fumes. It is critical to understand that with every laser cutting process GAS and particles are being created that needs to be filtered out to protect humans and environment.

The objective of air filter is to have all laser cutting machines compliant to laws and regulations to meet acceptable emission concentration.

提供各廠對於建構空氣濾清器所需資料說明,以便針對有害氣體與煙味不會傷害人員健康,並符合當地法律規範

Once again,

Do not only consider investments in laser cutting machines but also the extraction systems!

提醒各廠不僅只留意投資機台成本,更需留意排煙系統架構

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General Information 概論

鐳射切割機排煙系統包含功能完善的空氣濾清器

As communicated earlier the **fume extraction system** includes a fully functioning **air filter**.

Laser cutting systems must include:

鐳射切割機包含

1. laser cutting machine 鐳射切割機

and

2. Fume extraction system 排煙系統

A **fume extraction system** consists of: 排煙系統包含

2.1 Connector 連接管

2.2 Duct 導管

2.3 Fan 風扇

2.4 **Air filter** 空氣濾清器



Introduction 簡介

Laser emission filtration is sophisticated as there are fine particles(PM 2.5) that are difficult to extract and control with simple filter systems. 使用簡易的空氣濾清器較難管控,排放微粒子(PM2.5)

Additionally harmful gases (VOC, SO₂, NO_x...) must also be removed from the duct system before released into the atmosphere. 此外,有害氣體(VOC,SO₂,NO_x)在排放於外在環境前,就於導管內消除

Effective laser emission system include a 2 steps multiple stage filtration

有效的排煙系統包含以下兩個步驟

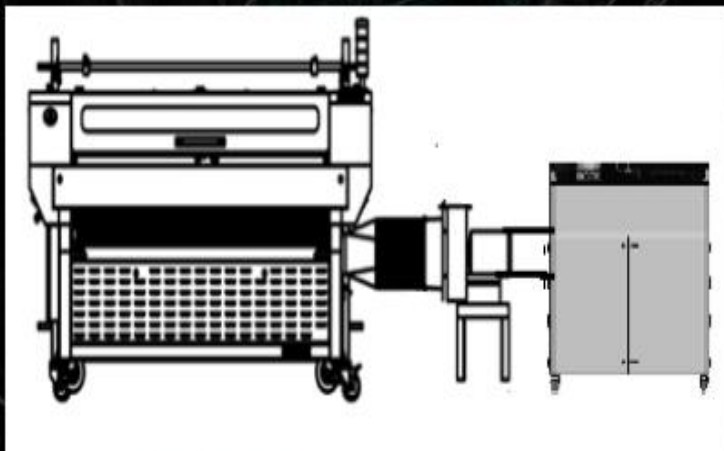
- Step 1: Fine particle filtration through multiple layers like water-spray, dehydration...
步驟1:微粒子排放需依靠噴水裝置與干燥設備
- Step 2: GAS / VOC filtration through use of chemicals / active carbon
步驟2:有害氣體(GAS/VOS)排放需依靠化學藥劑與活性碳

Air filter details - 2 types for different machine set up

空氣濾清器說明-不同數量機台排煙系統裝設方式

A Single machine set up

單一鐳射機台裝設

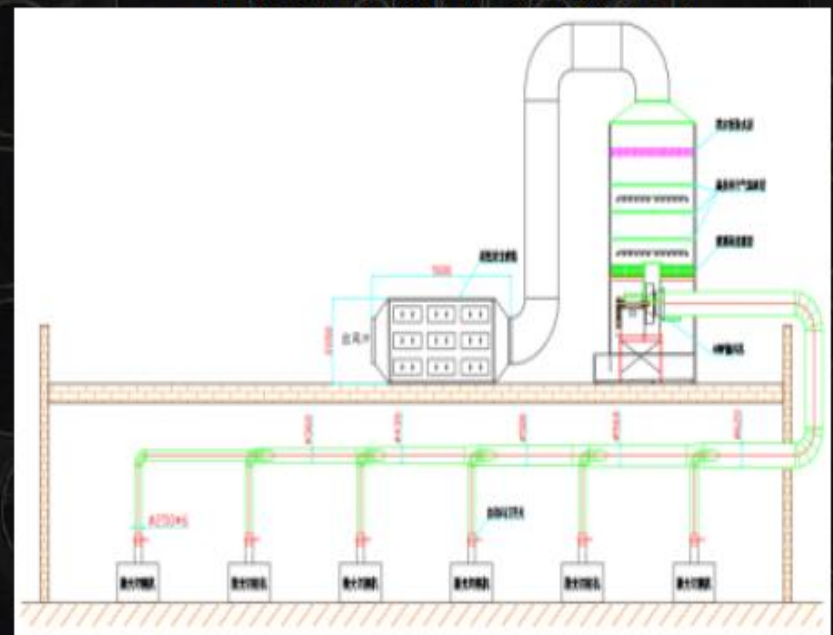


Solution provider: BOFA International Ltd.

方案提供者:BOFA

B Multiple machines set up

6台鐳射機台裝設方式



Solution provider: Dongguan Jingcheng

方案提供者: 東莞 Jingcheng

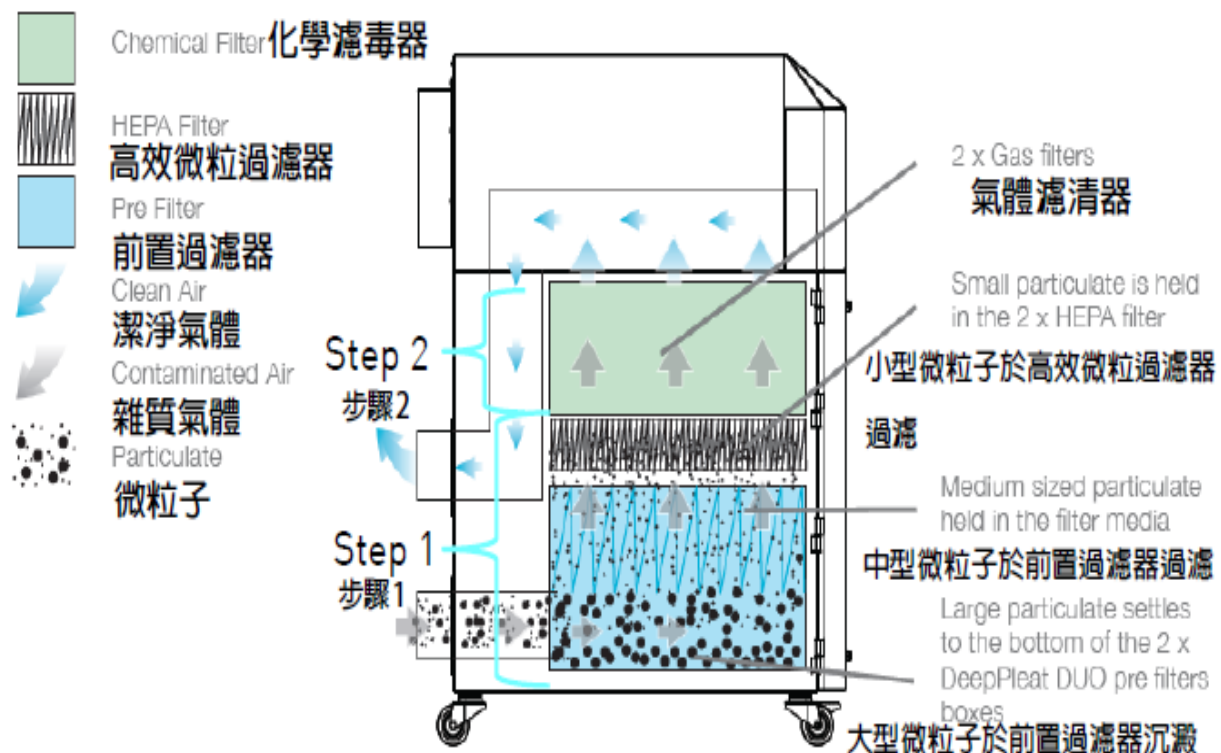
Air filter details – for single machine

空氣濾清器說明-單一鐳射機裝設方式

A Multiple stage filtration built into a small sized mobile unit.
多種不同類型成份裝置於一台小車內



AD 3000 IQ, BOFA

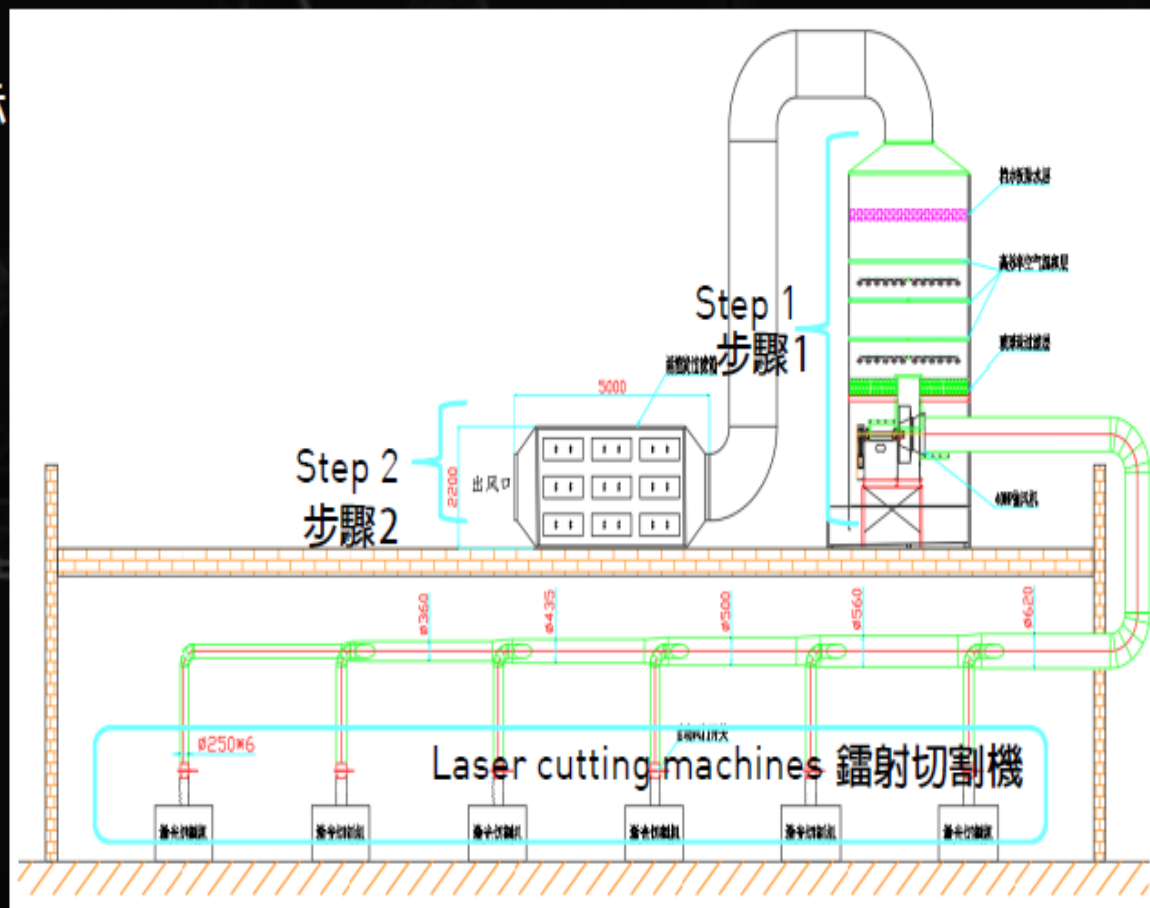


Air filter details – for multiple machine

空氣濾清器說明-多台鐳射機裝設方式

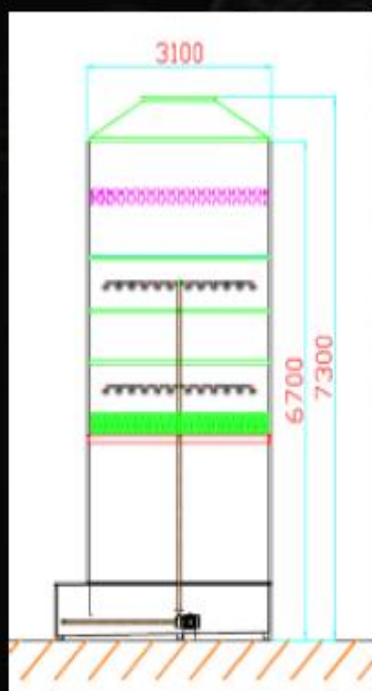
B High capacity filtration system with 2 units for particle and gas filtration.

針對微粒子與氣體有效排除需裝置如圖示



STEP 1: Fine particle filtration 步驟1:微粒子排放

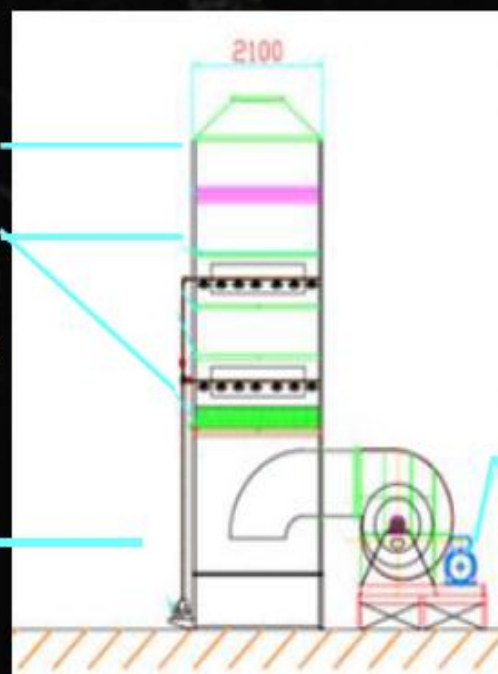
Contaminated fumes enter the particle filter system that operates with water and liquid chemicals. 雜質氣體流入於濾清器內,並依靠噴水設備與化學液體過濾



FRONT VIEW 前邊示意圖

Dehydration filter
干燥設備
Water spray/glass
bead filter
噴水設備&玻璃細珠濾清器

Water pump
水幫浦



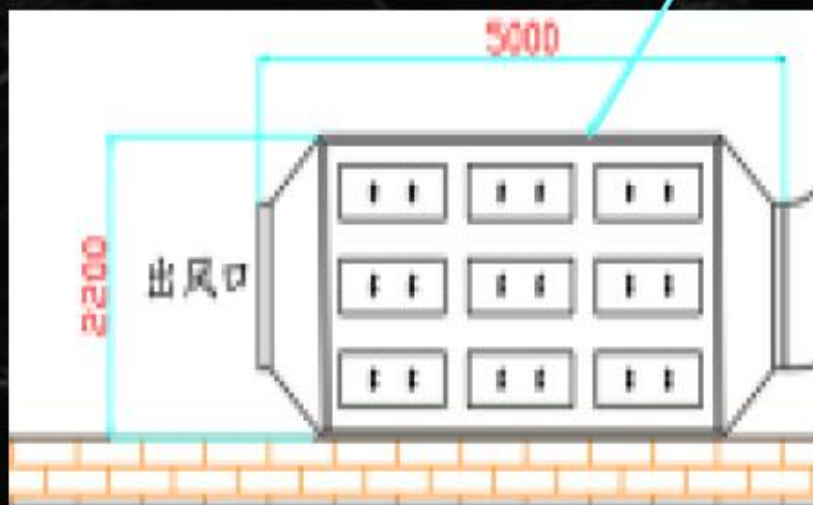
Air fan
氣扇

SIDE VIEW 側邊示意圖

STEP 2: GAS / VOC filtration 步驟2:氣體(GAS/VOC)排放

Active carbon used to absorb harmful gas in second stage of filtration system. Clean air is released to the atmosphere. 活性碳可吸收有毒氣體,並將潔淨氣體排放於外在環境

Active carbon
活性碳



FRONT VIEW
前邊示意圖

Air filter details – Theory 空氣濾清器說明-理論

- **Water spray filter / Glass bead filter* 噴水設備/玻璃細珠濾清器**

The purpose of the top to down water spray system is to bind the particles for further extraction. Alkaline liquid like NaOH will neutralize the high acid gas (HCL, SO₂, HF, part of Nox). Additional glass bead filter will help further to bind the particles, same as the water filter system does. 為更有效排放微立子,噴水設備採由上至下方式裝設,此外,鹼性液體(NaOH)能夠有效中和高強度酸性

- **Dehydration layer 干燥設備** 液體(HCL,SO₂,HF),而玻璃細珠濾清器能夠加速排放微粒子

Separate moisture and gas, to ensure the absorption effect of activated carbon
用於分離水份與氣體,並確保活性碳能夠有效吸收氣體

- **Activated carbon 活性碳**

Remove VOC and eliminate odor.
用於排放VOC與消除氣味

** Important: All liquids need to be treated before discharged*

重點提示:所有液體於排放前,需確保適當污水處理

Air filter - Consumable 空氣濾清器說明-消耗品

STEP 1: Use Alkaline to neutralize the acid fume particles 步驟1:鹼性液體中含酸性微粒子



ALKALINE
鹼性液體

STEP 2: Active Carbon absorbs remaining harmful cases 步驟2:活性碳吸附有害氣體



ACTIVE CARBON
活性碳

Specific country environmental regulations 特定國家環境法規

There are clearly stipulated regulations on acceptable air emission in different countries that we are required to meet.

不同國家對於氣體排放皆設定嚴格標準,因此,需確實遵守

Referenced environmental law相關法規如下

- China – GB 16297 -1996
- Indonesia - SNI 19-0232-2005
- Vietnam - QCVN 19: 2009/BTNMT



Suppliers contact 供應商聯系

Below are referenced suppliers, you could also seek qualified local supplier to build up air filter meet environmental regulation! 下表為建構空氣濾清器合格廠商,各廠可自行聯系

A Single machine set up

空氣濾清器-單一鐳射機裝設

- YM laser
- levin@ymlaser.com
- 6275464@gmail.com
- +86 13925872271

B Multiple machines set up

空氣濾清器-多台鐳射機裝設

- Dongguan Jingcheng
- gteam.sam@gmail.com
- 1156136079@qq.com
- +86 18898838816

建構排煙系統成本預估

Estimated costs for a complete laser cutting system

Set Up costs 各項成本		Single m/c 單台鐳射機成本		Multiple m./c 多台鐳射機成本	
Laser Cutting machine 鐳射切割機	1x laser cutter 1台切割機	~ \$ 14,500		Up to 6 machines 6台切割機	~ \$ 87,000 (6 m/c)
Extractions system 排煙系統	N.A.	N.A.		Duct system	~ \$ 2,300
Filtration system 空氣濾清器	BOFA	\$ 10,600		Filter	~ \$ 30,000 – 50,000
Total set up costs 總價		~ \$ 25,100			~ \$ 119K - \$ 139K

Operation Costs 管銷成本		Single m/c 單台鐳射機成本		Multiple m./c 多台鐳射機成本	
Utilities	TBD	TBD		TBD	TBD
Consumables 消耗品	Filter 6m – 12 m 濾清器	~ \$ 2,300 annually 每年		<ul style="list-style-type: none"> Active carbon 活性碳 Alk. chemicals 鹼性藥劑 	~ \$ 2,300 annually 每年





Thank you!