

# **3D PRINTING** ADDITIVE MANUFACTURING

RAPID PROTOTYPING | DIRECT DIGITAL MAUFACTURING

TIGER-VAC.EU



SPECIALIZING IN THE DESIGN AND MANUFACTURE OF LEGALLY CERTIFIED PORTABLE INDUSTRIAL VACUUM AND DUST COLLECTION SYSTEMS FOR CONTAMINATION CONTROLLED ENVIRONMENTS AND HAZARDOUS LOCATIONS SINCE 1983

# **NEW INDUSTRIAL REVOLUTION**

Additive manufacturing, a new industrial revolution, is a manufacturing technique that has revolutionized the way products and consumer goods are made. Emerged in the 1980s, today, it has arrived at the maturity phase, where products that were difficult to produce by conventional processes are now possible.

### **7 FAMILIES OF ADDITIVE MANUFACTURING**

According to ASTM F2792 Standards



#### **VAT PHOTOPOLYMERIZATION**

A vat of liquid photopolymer resin is cured through selective exposure to light (via laser or projector) which then imitates polymerization and converts the exposed areas to a solid part.



#### **POWDER BED FUSION**

Powdered materials is selectively consolidated by melting it together using a heat source such as a laser or electron beam. The powder surrounding the consolidated part acts as support material for overhanging features.



#### **BINDER JETTING**

Liquid bonding agents are selectively applied onto thin layers of powdered material to build up parts layer by layer. The binders include organic and inorganic materials. Metal or ceramic powdered parts are typically fired in a furnace after they are printed.



**MATERIAL JETTING** 

Droplets of material are deposited layer by layer to make parts. Common varieties include jetting a photocurable resin and curing it with UV light, as well as jetting thermally molten materials that then solidify in ambient temperatures.



#### SHEET LAMINATION

Sheets of material are stacked and laminated together to form an object. The lamination method can be adhesives or chemical (paper/plastics), ultrasonic welding, or brazing (metals). Unneeded regions are cut out layer by layer and removed after the object is built.



#### **MATERIAL EXTRUSION**

Material is extruded through a nozzle or orifice in tracks or beads, which are then combined into multi-layer models. Common varieties include heated thermoplastic extrusion (similar to a hot glue gun) and syringe dispensing.



#### **DIRECTED ENERGY DEPOSITION**

Powder or wire is fed into a melt pool which has been generated on the surface of the part where it adheres to the underlying part of layers by using and energy source such as a laser or electron beam. This is essentially a form of automated build-up welding.



HEPA FILTERS

IMMERSION SEPARATOR SYSTEM Tiger-Va

WET (WATER) MIX



MOTOR HEAVY DUTY 2-STAGE BYPASS ELECTRIC MOTOR

COALESCING FILTER ELEMENT TO SEPERATE AIR FROM MOISTURE

DEGASSING VENT HYDROGEN RELIEF VALVE

### MIST ARRESTOR

DESIGNED TO REMOVE CONTAMINANTS FROM PROCESS AIR EMISSIONS THAT EVOLVE AS MIST DROPLETS

SEPARATOR CONE TO PREVENT DROPLETS AND DUST FROM REACHING THE POWER SYSTEM

DETACHABLE STAINLESS STEEL 304 DETACHABLE INTERCEPTOR TANK

SIEVE BASKET SEPERATE THE SLUDGE FROM THE NEUTRALIZING LIQUID

LIOUED LEVEL INDICATOR

IMPACT-RESISTANT POLY



#### CAPACITY COPACITY OF 5 kg OF DUST INTO 25L OF WATER

**304** STAINLESS STEEL 304 CONSTRUCTION AND INTERCEPTOR TANK



SINGLE PHASE

### Water Mix C-10 EX (IT-63L) CFE

IMMERSION SEPARATOR

1111

220-240 V
50/60 Hz
1200 W
1.2 kW
5 A
194 m <sup>3</sup> /h
2504 mm H20
72 dB(A)

DRAIN VALVE 38 mm

# **YOUR METALS AND YOUR PROCESSES**

The first step in a dust hazard analysis is to identify all dusts and fumes produced in your facility and determine their combustion risk. Laboratory testing may be necessary for this determination. Be sure to review all areas of your operation and all dusts present, including dust and fume mixtures. Metals that are stable in one process can be volatile when oxidized or mingled with other metals Manufacturing facilities processing combustible metals needs to understand their risks and develop an appropriate mitigation strategy. The DHA process helps metal shop owners address these risks early and may help reduce the likelihood and consequences of a combustion event. By knowing what your combustible dust is, where it occurs, and how to mitigate the risks it presents, you can develop a mitigation strategy that supports new growth opportunities.



# **RECOVER.REFRESH.REUSE.**

Failure to recover powder is an economic loss, even without considering the other risks that have already been described. As the cost of the powder increases, so too does the incentive to recover more of it. In a manufacturing environment, saving even a modest percentage of wasted powder over time turns into a significant amount of money. A manufacturer's nightmare is seeing profits almost literally slipping away between one's fingers. The last 5 to 10% of powder is the most expensive to remove

#### **HIGH EFFICIENCY** CYCLONE ALLOWING UP 0⁄0 TO **OF POWDERS TO BE REUSED**

### **EXP1-20 DT**

with 3D TOOLKIT

TENSION	230 V
FREQUENCY	50 Hz
WATTAGE	1000 W
POWER	1 kW
AMPERAGE	4.5 A
AIR FLOW	224 m3/h
VAC. PRESSURE	1550 mm H2C

RECOVER REFRESH REUSE

304	STAINLESS STEEL 304 FILTER CHAMBER and RECOVERY TANK
PRS	POWDER RECOVERY SYSTEM

HIGH RECOVERY SYSTEM EFFICIENCY CYCLONE

ATEX & IECEX CERTIFIED FOR CONDUCTIVE DUSTS IIIC GROUP IIIC

**C-10 EX DT** 

with 3D TOOLKIT		
TENSION	220-240 V	220-240 V
FREQUENCY	50/60 Hz	50/60 Hz
WATTAGE	1200 W	1100 W
DOWED	1.0.1.11	4.4.1.317
POWER	1.2 KW	1.1 KW
AMPERAGE	5 A	8 A
AMPERAGE AIR FLOW	5 A 194 m <sup>3</sup> /h	8 A 215 m <sup>3</sup> /h
AMPERAGE AIR FLOW VAC. PRESSURE	5 A           194 m3/h           2504 mm H20	8 A 215 m <sup>3</sup> /h 2250 mm H20

• MORE POWER LONGER LIFE
 NO MAINTENANCE

> STAINLESS STEEL 304 FILTER CHAMBER and RECOVERY TANK

> > POWDER HE RECOVERY J SYSTEM

HIGH

EFFICIENCY

CYCLONE

ATEX & IECEX CERTIFIED FOR CONDUCTIVE DUSTS IIIG GROUP IIIC

BLSD **BRUSHLESS MOTOR** 

Cat.3



#### **PRE-SEPARATION SYSTEMS** FOR FINF DUST

4H14 HEPA FILTERS

1-10

RECOVERY OF COMBUSTIBLE DUST AND NON-COMBUSTIBLE DUST

#### HEC-25L (4W) LOW / HIGH PRESSURE

SUCTION INLET 38 mm AIR OUTLET 38 mm

# RECOVER.REFRESH.REUSE.

Thorough cleaning of the build chamber in the post-process is essential to ensure the integrity of future builds. Utilizing a High Efficiency Industrial Vacuum designed for the safe handling of Combustible Powders to effectively clean crevices and hard to reach areas in a quick, safe and efficient way to safeguard your employees and company.

Tiger-Vac

#### **ADVANTAGES :**

METAL

DUST

MUST BE USED IN

USE IN HAZARDOUS

LOCATIONS

CONJUNCTION WITH A

CERTIFIED TIGER-VAC® VACUUM SYSTEM FOR

 LOW CAPITAL COST • LOW PRESSURE DROP

RECOVER REFRESH REUSE

- NO MOVING PARTS DRY COLLECTION
- SMALL SPACE REQUIREMENTS • SAFE RECOVERY OF FINE DUST



SUCTION INLET ESD SAFE

CONDUCTIVE PLASTIC

ESD SAFE CONDUCTIVE PAINT, **OR STAIINLESS STEEL** 

ESD SAFE CONDUCTIVE POLY LINER RECOVERY BAG

ESD SAFE CONDUCTIVE WHEELS







HEAVY DUTY CONSTRUCTION STATIC DISSIPATIVE AND GROUNDED

HEC-35L (4W) LOW / HIGH PRESSURE SUCTION INLET 50 mm

AIR OUTLET 38 mm



SINGLE

**HEPA FILTER** 99.99% EFFICIENCY AT 0.3 MICRON

### POWERHEAD

BYPASS AMETEK® LONG LIFE MOTOR WITH 4 HEPA FILTERS CLASS H14

**STAINLESS STEEL 430** STAINLESS STEEL FILTER CHAMBER AND RECOVERY TANK



MFS MANUAL FILTER SHAKER

**POLY LINER** CONDUCTIVE POLY LINER **RECOVERY BAG** 

C-35L EX DT (MFS) DRY RECOVERY

	6		
E		-2	R



SINGLE

PHASE

**HEPA FILTER** Cat.3 99.99% EFFICIENCY 0.3 MICRON S EL

**BRUSHLESS MOTOR** 

220-240 V 50/60 Hz 1100 or 1200 W 1.1 or 1.2 kW 194 or 215 m3/h 2250 or 2504 mm H20

**35**ī RECOVERY CAPACITY



CE ORI

WARN

### **RECOVER COMBUSTIBLE DUST IN ANY ENVIRONMENT**

Regardless of facility type, vacuuming is the recommended cleaning and collection method. All Notified Bodies recommend ongoing dust housekeeping procedures to manage dust levels between cleaning and collection.

Those measures include, but are not limited to the following: smaller dust cleaning sessions at regular intervals; regularly cleaning floors and horizontal surfaces to minimize dust accumulation; ensuring dust accumulation is no more than 1/32 inches thick at any given time; finally, ensuring that electric cleaning devices like Vacuum Systems are certified accordingly and approved by Notified Body for category and zone classification.

#### **YOUR SAFETY - OUR REALITY**

In addition to a comprehensive range of Application Safety, we offer you expert advice on how to choose the right Vacuum System for your application and help you solve your safety problems. Get in touch with us at info@tiger-vac.it | (39) 051 79.53.52

#### 2D-10 (4W)

DHT NEGUVENT		
TENSION	220-240 V	220-240 V
FREQUENCY	50/60 Hz	50/60 Hz
WATTAGE	1200 W	1100 W
POWER	1.2 kW	1.1 kW
AMPERAGE	5 A	8 A
AIR FLOW	194 m <sup>3</sup> /h	215 m <sup>3</sup> /h
VAC. PRESSURE	2504 mm H20	2250 mm H20

 MORE POWER LONGER LIFE **BRUSHLESS MOTOR** • NO MAINTENANCE





STAINLESS STEEL 430 RECOVERY TANK

Tiger-Vac\*





liger-Vac

ADJUSTABLE BETWEEN 0 Bar to 10 Bar

PRESSURE

FACTORY SET AT 5.5 Ba FOR IDEAL PERFORMANCI AND NOISE LEVEL

> **EXPLOSION PROOF**/ DIIST **IGNITION PROOF**

#### **PNEUMATIC** ATEX-10A (40L) SINGLE VENTURI DRY RECOVERY VENTURI Single AIR LINE SIZE 12.7 mm AIR FLOW 187 m3/h POWER 15 HP INPUT AIR VOLUME 16.5-21.2 L/s INPUT AIR PRESSURE 5.5 Bar

Cat.2

VAC. PRESSURE 2790 mm H<sub>2</sub>0 EXP1-10 (40L) PHASE DRY RECOVERY TENSION 230 V FREQUENCY 50 Hz WATTAGE 1000 W POWER 1 kW AMPERAGE 4.5 A **AIR FLOW** 224 m3/h

VAC. PRESSURE 1550 mm H<sub>2</sub>0

SINGLE



4H14 HEPA

H

IMMER SEPAR SYST

#### **ADVANTAGES :**

VAC. PRESSURE

2504 mm H20

2STAGE HEAVY DUTY 2-STAGE BYPASS MOTOR

• PROVEN SOLUTION FOR FINISHING APPLICATIONS FOR ALMOST ALL ALUMINUM, MAGNESIUM OR TITANIUM ALLOYS

CFE

- BETTER RELIABILITY AND LOWER COST OF OPERATION
- OFFERING THE KIND OF PIECE OF MIND THAT BUSY PLANT, SAFETY AND MAINTENANCE MANAGERS DESIRE
- MINIMIZING COST IF USING OIL AS NEUTRALIZING LIQUID
- MORE FILTRATION MEDIA

DETACHABLE

RECOVERY

TANK

**ESD SAFE** 

3ι **RECOVERY CAPACITY** CONDUCTIVE WET BAG PACKAGE OF 3

<b>304</b> STAIN FILTER RECO	ILESS STEEL 304 R CHAMBER and VERY TANK	SINGLE         HEPA FILTER           99.99%         EFFICIENCY           AT 0.3 MICRON
BLSC BRUSHLESS MOT AVAILAB	• MORE POWER • LONGER LIFE • NO MAINTENAM	NCE
Oil or Wat	er Mix	
C-10 EX (	IT-40L) DT ARATOR	ALUMINUM MESH SCREEN TO PREVENT MIST EROM
TENSION	220-240 V	REACHING THE POWER
FREQUENCY	50/60 Hz	SYSTEM
WATTAGE	1200 W	
POWER	1.2 kW	
AMPERAGE	5 A	
AIR FLOW	194 m <sup>3</sup> /h	38 mm

COALESCING

FILTER

ELEMENT

**30** mm SUCTION INLET

ELECTROSTATIC DISCHARGE **ESD SAFE** SAFE

HEPA FILTERED

Tiger-Vac\*

**DETACHABLE TANK** STAINLESS STEEL 304 **RECOVERY TANK** 



WITH LOCKING SYSTEM TO PREVENT ACCIDENTAL SPILLS

WET BAG 4.5 L CONDUCTIVE WET BAG

### Water Mix C-10 EX (IT-40L)

TENSION

FREQUENCY

WATTAGE

POWER

AMPERAGE

AIR FLOW

VAC. PRESSURE

Cat.3

IMMERSION SEPARATOR

220-240 V

50/60 Hz

1200 W

1.2 kW

194 m<sup>3</sup>/h

2504 mm H20

5 A

B	LS	B		
RRIIS	HI FSS	М	ητη	R

220-240 V

50/60 Hz

1100 W

1.1 kW

215 m3/h

2250 mm H20

8 A

MORE POWER
 LONGER LIFE
 NO MAINTENANCE

SINGLE	
PHASE	
PHASE	



#### EXPLOSION PROOF / DUST IGNITION PROOF

# **BOOST PRODUCTIVITY AND SAFETY**

When handling combustible dust or powder in an AM environment it is important to fully understand the potential volatility of the different powders you will use in your process. Additional considerations that need to be addressed are how you expect to handle the collected waste. Tiger-Vac has the largest selection of industrail vacuums for all your AM needs.





3 L RECOVERY CAPACITY CONDUCTIVE WET BAG PACKAGE OF 3





#### EXPLOSION PROOF / DUST IGNITION PROOF

# Water Mix **EXP1-10 (IT-40L) EX**

IMMERSION SEPARATOR

TENSION	230 V
FREQUENCY	50 Hz
WATTAGE	1000 W
POWER	1 kW
AMPERAGE	4.5 A
AIR FLOW	224 m <sup>3</sup> /h
VAC PRESSURE	1550 mm H20



SINGLE

PHASE



Continuous Duty 24

# **CHOOSING THE RIGHT VACUUM SYSTEM**

Users have been left to their own devices to manage the risks and inconvenience of part and powder removal in the way they best see fit. The moment the build has run its course, and the parts are ready to be transferred out of the machine for further processing, turns out to be the weak link in the workflow. Trust Tiger-Vac to help you manage productivity and continue running at peak efficiency info@tiger-vac.it | (39) 051 79.53.52



PRESSURE REGULATOR ADJUSTABLE BETWEEN 0 Bar to 10 Bar

FACTORY SET AT 5.5 Bar FOR IDEAL PERFORMANCE AND NOISE LEVEL



3 L RECOVERY CAPACITY CONDUCTIVE WET BAG PACKAGE OF 3



EXPLOSION PROOF / DUST IGNITION PROOF

# Water Mix

ATEX-10A (IT-40L) CFE IMMERSION SEPARATOR

VENTURI	Single
AIR LINE SIZE	12.7 mm
INPUT AIR VOLUME	16.5-21.2 L/s
POWER	15 HP
SUCTION INLET	38 mm
AIR FLOW	187 m <sup>3</sup> /h
VAC. PRESSURE	2790 mm H20



**68** dB(A)

50 mm SUCTION AIR INLET

#### CFE

COALESCING FILTER ELEMENT TO SEPERATE AIR FROM MOISTURE

#### **UPPER CONE + CYLINDER**

TO PREVENT MIST BUILDUP FROM REACHING THE POWER SYSTEM ALLOWS THE MIST TO REMAIN IN THE FILTER CHAMBER

#### **SEPARATOR CONE**

TO PREVENT DROPLETS AND DUST FROM REACHING THE POWER SYSTEM

#### DETACHABLE STAINLESS STEEL 304

DETACHABLE FILTER CHAMBER AND INTERCEPTOR TANK

TEFC MOTOR EXPLOSION PROOF MOTOR WITH EX CERTIFIED SWITCH BOX

LIQUID LEVEL INDICATOR IMPACT-RESISTANT POLYCARBONATE

SIEVE BASKET SEPERATE THE SLUDGE FROM THE NEUTRALIZING LIQUID

Cat.2

**EXPLOSION PROOF /** 

**DUST IGNITION PROOF** 

DRAIN VALVE 38 mm WITH LOCKING SYSTEM TO PREVENT ACCIDENTAL SPILLS

Oil or Water Mix
CD-IT (85L) EX CFE 114L
IMMERSION SEPARATOR

### 160L

Tiger-Vac

TENSION	400 V	400 V	400 V
WATTAGE	2200 W	4000 W	7500 W
POWER	2.2 kW	4 kW	7.5 kW
AMPERAGE	4.8 A	8.7 A	16.2 A
AIR FLOW	212 m <sup>3</sup> /h	299 m <sup>3</sup> /h	850 m <sup>3</sup> /h
VAC. PRESSURE	2540 mm H20	3380 mm H20	4370 mm H20
VRV SETTING	1780 mm H20	2030 mm H20	2795 mm H20

## **YOUR CHALLENGES**

As new manufacturing technologies emerge, so do dust mitigation challenges. 3D printing frequently uses powered metals like aluminum, titanium, and magnesium, which introduce a whole new level of combustible metal dust handling, collection, and safety concerns to an already complex topic. There's no wrong time to take even small steps to address combustible metal dust challenges. Everything doesn't have to be completed at once, and every effort in mitigation increases safety for the shop and its employees.







HEPA FILTER 99.995% EFFICIENCY AT 0.3 MICRON

### DESIGNED FOR THE RECOVERY AND INERTIZATION OF CONDUCTIVE AND EXPLOSIVE DUST

TITANIUM  $\cdot$  ALUMINUM  $\cdot$  MAGNESIUM  $\cdot$  ZIRCONIUM AND OTHER COMMERCIAL ALLOYS



#### DESIGNED TO CAPTURE AIRBORNE / FUGITIVE DUST

EXPLOSION PROOF / DUST IGNITION PROOF

HEPA FILTERED

0

#### ADVANTAGES :

- ALUMINIZED SPUN BOND CARTRIDGE PROVIDING VERY GOOD MOISTURE AND ABRASION RESISTANCE
- REDUCING THE NUMBER OF PARTICLES IN THE AIR AND IMPROVING AIR QUALITY WITH A HEPA FILTER
- NO SHUT-DOWNS AND OPERATING WITHOUT INTERRUPTION WITH FILTER CARTRIDGE PULSE CLEANING (MANUAL OR WITH AUTOMATIC TIMER)

#### **EXTRACTION ARM**

6 in. SUCTION INLET with 6.6 ft. or 10 ft. REACH

#### HEPA FILTER

DOWNSTREAM HEPA FILTER WITH AN EFFICIENCY OF 99.99% AT 0.3 MICRON

### SWITCH BOX

GROUP E (METAL DUST) MOTOR & SWITCH AVAILABLE

#### **FILTER CARTRIDGE**

ALUMINIZED SPUN BOND CONDUCTIVE CARTRIDGE WITH AN EFFICIENCY OF 97% AT 0.3 MICRON

#### AVAILABLE FILTER CARTRIDGE

HEMIPLEAT® EXTREME FLAME RETARDANT CONDUCTIVE CARTRIDGE WITH CARBON WITH AN EFFICIENCY OF 99.99% AT 0.5 MICRON







HEPA FILTER 99.99% EFFICIENCY AT 0.3 MICRON

**304** STAINLESS STEEL 304 CONSTRUCTION AND EXTRACTION ARM

### CD-600 EX HEPA

DUST COLLECTOR

TENSION	230 or 400 V
FREQUENCY	50 Hz
WATTAGE	1500 or 2200 W
POWER	1.5 or 2.2 kW
AMPERAGE	4.8 or 12.3
AIR FLOW	1000 m <sup>3</sup> /h
SOUND LEVEL	72 dB(A)





CD-1200 EX

THREE

DUST CULLECTOR	
TENSION	400 V
FREQUENCY	50 Hz
WATTAGE	4000 W
POWER	4 kW
AMPERAGE	8.7 A
AMPERAGE AIR FLOW	8.7 A 2000 m3/h
	TENSION FREQUENCY WATTAGE POWER





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