VERSION 04/14

FLAME TREATMENT DEVICES

WHY USING FLAME TREATMENT?

Certain kind of plastic materials cannot be printed unless applied with surface pre-treatment.
The print difficulty is due to the fact that the physic-chemical properties of the ink are different from those of the substrate.

One of the differences which most influence the incompatibleness of the two materials is their dissimilar surface energy.

The index of "wettability" of a solid is determined by its surface energy which if prepared to be higher than that of the ink, will favour the ink adhesion to the substrate.

Every material has got its own surface energy that is measured in Dynes grade (dyne/cm).

Good adhesion to the material to be printed can only be obtained when substrate surface energy is greater then ink's one. When using solvent base ink, the most used in pad printing, the minimum surface energy of substrate to print an ink is 40 dynes/cm. Below that value the adhesion of the inks will not be sufficient.

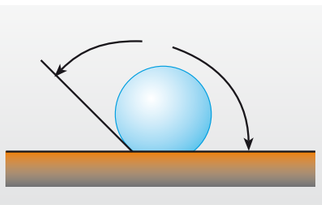
As some materials such as polyethylene (PE) and polypropylene (PP), have a low surface tension (about 30 dynes/cm), they need to be applied with pre-treatment to rectifying surface wettability for successful printing.

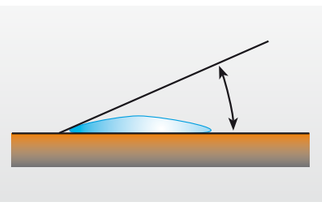
Wettability level inappropriate

Wettability level not sufficient

Wettability level appropriate

Tosh supplies a kit to substrate surface energy measuring.





Flame pre-treatment is a method of chemically and physically changing the surface molecular structure of the substrate to increase wettability.

The wettability is the ability of a liquid to completely spread upon a flat and horizontal surface of a solid.

The best wettability is obtained when the contact angle (α) of the liquid on the substrate is near to 0°'a1, the liquid is spread evenly on the surface.

Contrariwise, a poor wettability produces a contact angle nearer to 180° and the liquid divides into droplets.

The flame treatment besides increasing the surface tension, provides also possible impurities removal which can impede the good adhesion of the ink on the substrate.

The flame treatment is also used for post-treatment on acetalic resins POM (Hostaform, Delrin, etc..) to anchor the ink.

In the end, the flame-treatment is the most popular pre and post treatment method used on three-dimensional objects for high hourly production.

TOSH®
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TOSH S.r.l. - Via Lambro 84, I - 20089 Quinto Stampi Rozzano (MI)
Tel. +39 02 57566.1 (10 linee r.a.) - Fax +39 02 89200266
E-mail: info@tosh.it www.tosh.it

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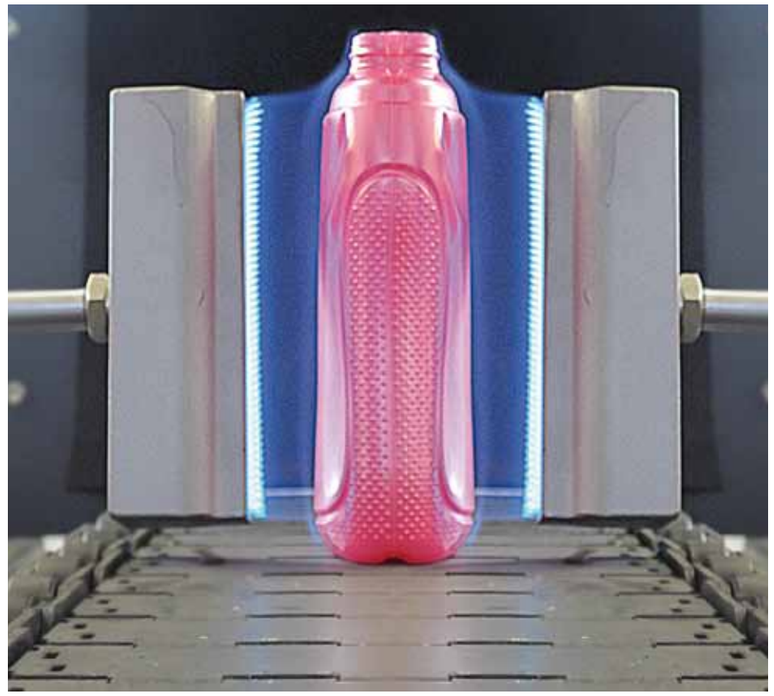
FLAME TREATMENT DEVICES

Flame pre-treatment is useful to increase the surface energy of certain plastic materials to prepare them being more receptive to pad printing inks.

Flame treatment is the most diffused pre- and post-treatment method on three-dimensional objects for high hourly production.



Tosh offers as standard equipment:

- **Flame Group**
  Compound of components to integration with part conveying accessories (i.e. rotary tables, conveyors...) for pre-treatment in the production line.
- **Flame unit**
  mod. FTU 02 a stand-alone unit for pre-treatment out of the production line.

Upon specific requirement Tosh can customize flame unit for special application.

CE

Designed and manufactured in compliance with machines European Standard

FLAME TREATMENT DEVICES

FLAME TREATMENT UNIT Mod. FTU 02 | "off-line"

Ideal for the flame-treatment when you can not pre-treated on board the machine.
The unit is compound of flame device and of numerically controlled system for parts shifting.

The part to be trated is positioned vertically inside a jig that is vacuum equipped, possible rotation during the translation towards the two flame burners.

Treatment capacity: around 600- 700 pcs/h

COMPOUND OF:

- N.1 Air gas mixture generator (compressed air - propane, butane or methane gas) fitted with electric board, shunt box for gas-air-flame detector electrovalves control, shunt box for piezoelectric transformer control for flame starting. All adjusting parameters handling for flame control can be displayed and set from PLC.
- N. 2 Flame burners type MPR3/100 (3 hole line with fixed lenght 100 mm), are mounted opposite sides on the belt's frame, possibility to adjust each single pre-treating position.
- N. 1 Numerically controlled sliding unit for the translation of the jig with vacuum system equipment, for holding parts to be treated. Parts can rotate under the flame burners.
- N. 1 Support bench complete with Safety guarding and photoelectric barriers.

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FLAME TREATMENT DEVICES

SET OF COMPONENTS FOR FLAME TREATMENT SYSTEM | "in-line"

The components are generally positioned on part conveying accessories such as rotary tables, oval flat conveyors or rectilinear tracked conveyors.

The set includes:
- Support structure

- Electrical panel with programmable PLC for flame control (up to 2 burners) and command of all on and off operations.

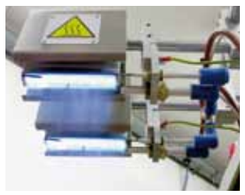
- Air/gas panel for combustible mixture generation

- Flame burner type MPR 3/100 (fixed length 100mm) connections, flexible tube, safety guarding and fixing support adjustable on 3 axis.

TECHNICAL FEATURES
- **Ac supply:** 230 V single phase/50-60 Hz
- **Electrical absorption peak:** up to 5 A
- **Electrical input:** up to 500 W (with 2 burners)
- **Compressed air (filtered and dried):** 6 bar, 200lts nlt/min (with 2 burners)
- **Usable gas:** propane, butane, methane (liquid gas cylinder or gas system)
- **Average gas consumption:** around 1-1,5 m3/h for 1 burner type MPR3 (3 hole line fixed length 10mm)
- **Sizes:** 600 x 600 x 1200 (h) mm
- **Weight:** 40 kg

Single burner

Double burner



FLAME TREATMENT BURNERS

Tosh offers the possibility to purchase also single burner to allow configuring customised solutions.

Burners are designed to operate with a compressed air/gas mixture.
The air pressure is to be supplied between 20-50 psi (1.4 – 3.5 kg/cm2).
The gas (propane, butane, methane from gas cylinder or gas system) is to be supplied at low pressure (0,25 psi).

Type	Fixed length Max power 3 hole line	BTU/h	KCAL/h
MPR 3/50	50 mm	10.000	2.500
MPR 3/100	100 mm	20.000	5.000
MPR 3/150	150 mm	30.000	7.500
MPR 3/200	200 mm	40.000	10.000
MPR 3/300	300 mm	60.000	15.000
MPR 3/350	350 mm	70.000	17.500
MPR 3/400	400 mm	80.000	20.000

In addition Tosh gives the chance to purchase separately also the air/gas mixer and the burner support.