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.

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° α1, 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.
FLAME TREATMENT DEVICES

FLAME TREATMENT UNIT Mod. FTU 02 | “off-line”

Ideal for flame treatment when you cannot pre-treat on board the machine.
The unit is composed of flame device and of numerically controlled system for parts shifting.

FLAME TREATMENT DEVICES

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.