

## 2-Shot Engineered Sealing Solutions



## Introduction to Ceetak Ltd

Ceetak is a leading UK designer, developer and supplier of sealing solutions.

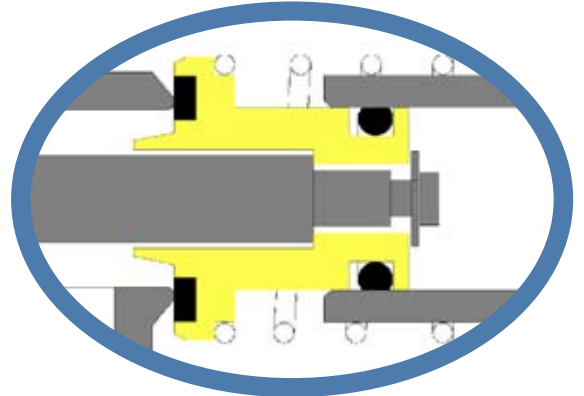
Our products are used throughout industry; from the most technically demanding applications, to high quality/high volume industrial components.

At Ceetak, we are more than just a supplier. Our core philosophy is to add real value to your business through innovative and truly cost effective engineered sealing solutions.

## What is 2-Shot Moulding?

The 2-shot moulding process allows the co-polymerisation of hard (or soft) plastics and thermoplastic elastomers (TPE's).

A 2-shot mould is designed with a top and bottom cavity. During the moulding process the 1st material is injected into the top cavity and the mould opens and rotates. The 1st material is then injected into the top cavity again, while the 2nd material is injected into the bottom cavity simultaneously. The mould then opens and the parts are ejected from the bottom cavity; the mould rotates again and the whole process is repeated.



2-shot moulding is not an unknown process. It has been used for years for aesthetic purposes, and examples of elastomers moulded to plastic can be seen in everyday life e.g. toothbrushes or screwdriver handles.

2-shot moulding has been used historically in a whole range of industries for a wide scope of products.

**There is however a big difference between these simple products and Ceetak's innovative 2-shot process; Ceetak uses 2-shot moulding technology to produce engineered products that perform a sealing function.**

Previously, manufacturers of high volume metal or plastic to rubber component assemblies have processed them via chemical or mechanical bonding, adhesives or over-moulding.

Although these methods may achieve the final assembly required, the processes involved are lengthy, and fraught with problem areas that require stringent controls.

A failure in any of these areas will result in poor quality parts, therefore making these methods unsuitable for critically engineered components.

By utilising 2-shot moulding technology, Ceetak can overcome these potential problems and produce skilfully engineered, reliable parts for sealing.

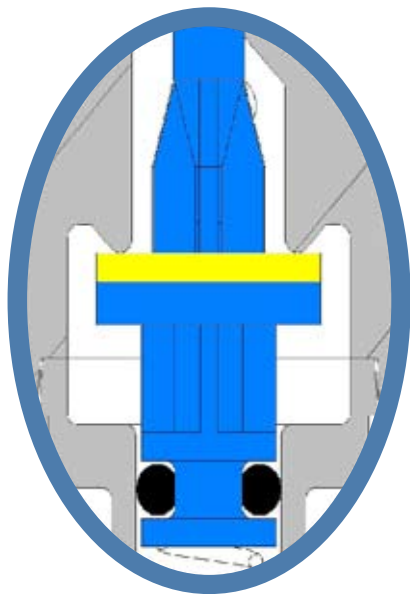
## What materials are suitable for 2-Shot moulding?

Thermoset compounds (such as nitriles, fluorocarbons, EPDM's) are not suitable for the 2-shot moulding process; instead of thermoset compounds we must use thermoplastic elastomers (TPE's).

TPE's are materials with elastomeric and thermoplastic properties, and are therefore suitable for melting at high temperatures in order to be co-polymerised to the secondary material.

Typical examples of TPE's are; Styrene Block Copolymers (TPE-S), Thermoplastic Polyurethane Block Copolymers (TPE-U), Copolyesters (TPE-E), Copolyamides (TPE-A), Olefinic Thermoplastic rubbers (TPE-O), Vulcanised Phase blends (TPE-V) and PVC/NBR blends.

Examples of the plastic materials most commonly used in the 2-shot moulding process are Polyamide (PA/Nylon), Polybutylene Terephthalate (PBT) and Polypropylene (PP).





# Material Compatibility

Cohesive Bond	
Adhesive Bond	

The table below shows the compatibility between materials:

	Polypropylene PP	Polyamide (Nylon) PA	Acrylonitrile Butadiene & Styrene ABS	Acetal POM	Polyethylene Terephthalate PET	Polybutylene Terephthalate PBT	Polycarbonate PC	Styrene Acrylonitrile Copolymer SAN
Geolast TPV/Nitrile	X							
Santoprene TPV/EPDM	X	X	X				X	
ETPV AEM+TPC-ET		X				X		
Zeotherm TPV/ACM		X						
Thermolast SEBS	X	X	X	X	X	X	X	X
Elastolan PU		X				X		



## 2-Shot moulding - replacing conventional thermoset rubbers with TPE materials

When replacing a thermoset rubber seal component application with a 2-shot moulding alternative, it is important to understand the performance of the materials within the application.

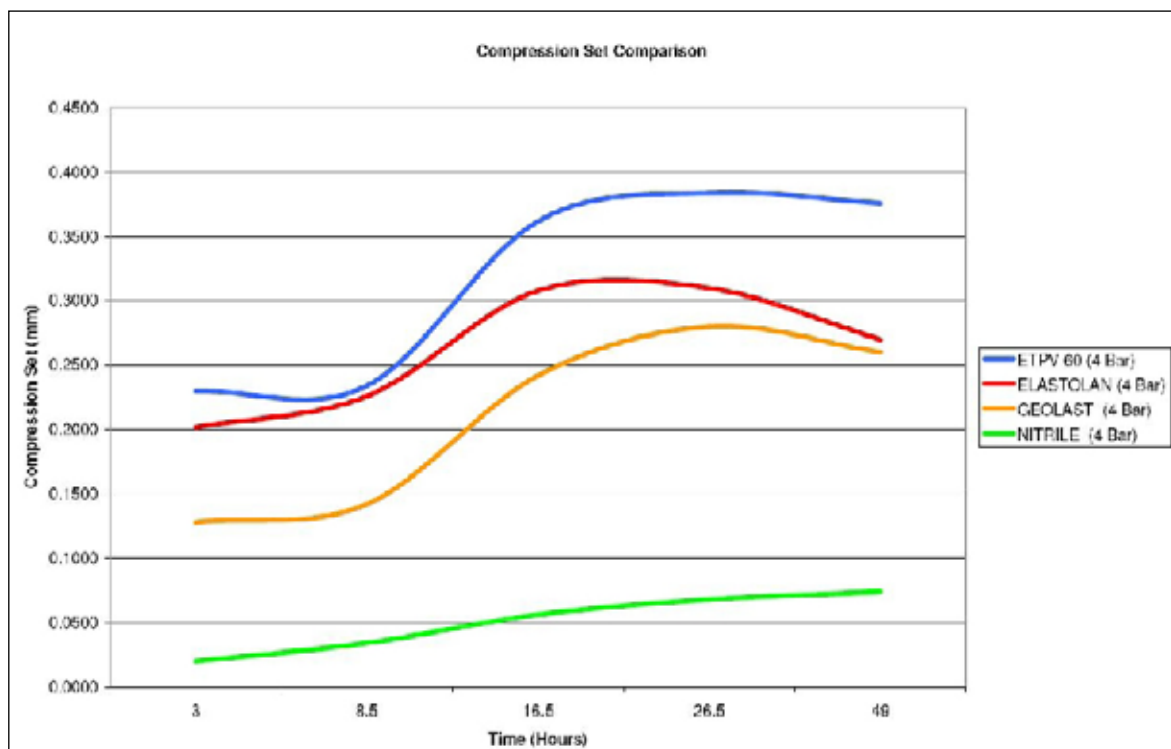
Ceetak's application engineers have conducted many hours of exhaustive testing to conclude that TPE's perform equally as well as standard thermoset rubbers (for example, NBR's, EPDM's).

For example, compression set is the measure of how much a material does not recover after being compressed. Both thermoset and TPE materials experience compression set and it is an important characteristic for engineers to consider when designing sealing solutions for bespoke applications.

The graph shown below demonstrates the compression set taken by a valve seat during a life test run at 4 bar pressure and 80°C.

The important characteristic to be understood from these results is NOT that NBR has the lowest compression set; but after 20 hours the TPE test result levels off, and the amount of compression set becomes constant at around 0.3 mm.

This important feature allows Ceetak engineers to create seat/seal designs which accurately accommodate the initial compression set of TPE's, so that a long term 2-shot seal within our customers products can be achieved and maintained.

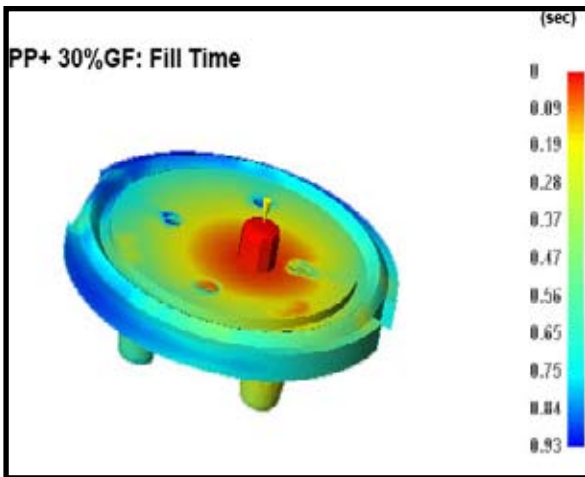
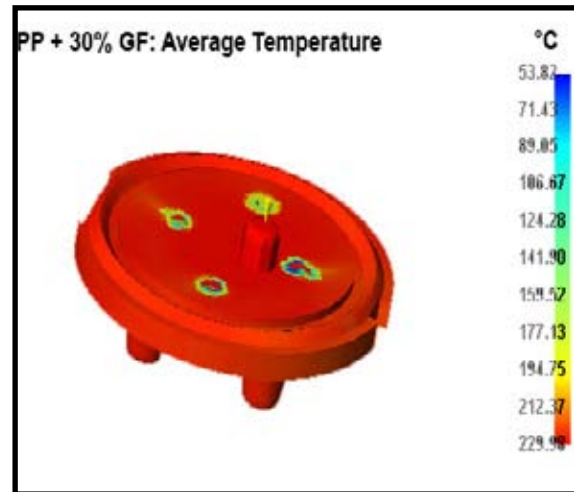


## Ceetak Design and Technical capabilities

Ceetak's team of experienced application engineers are dedicated to providing a complete design service from the initial concept to final production; using the latest 2-shot design technology.

Each bespoke customer application is individually assessed, and our engineers use their many years experience and knowledge, along with the latest in 3D modelling technology to design the perfect 2-shot seal for each project.

We use the latest FEA technology (as shown right and below) to anticipate the finest details in mould performance. Based on this information we can adjust our seal designs accordingly to ensure our customers get the highest performance possible from their 2-shot seals.



Extensive testing is involved in designing the correct geometry for the seal, as well as careful analysis given to material selection to ensure optimal performance of the 2-shot seal.

We are approved to ISO9001:2000, with our manufacturing facilities approved to TS16949.

On site testing facilities include 3D non-contact measurement, compression set testing and material hardness testing.

## A summary of Ceetak's 2-Shot Moulding

**High performance** - 2-shot moulding performs as well as, if not better than standard thermoset rubber compounds

**Powerful molecular bond** - Co-polymerisation of TPE's and plastics provide reliable and high integrity products

**Cost reductions** - Part cost savings as mouldings are produced in a single tool, meaning reduced running costs and no requirements for pre- and post-moulding processes

**Reduced cycle times** - Both phases of material injection occur simultaneously therefore saving on production time

**Fewer component parts** - Lower weight and reduced labour costs due to no requirement for post-production assembly

**Experienced Engineering** - Our engineers design the perfect 2-shot sealing solution for your application; from sealing geometry to material selection



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