

**ArmaSert™**



**Armstrong  
Precision  
Components Ltd.**

A **CAPARO** Group Company

**ARMASERT  
BRASS  
INSERTS**

**4**



# ARMASERT BRASS INSERTS

## Other product brochures available:



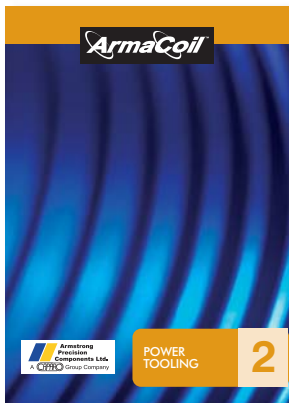
## 1 TECHNICAL DATA & TOOLING

The comprehensive catalogue for **ArmaCoil** inserts.

All the data on material and finishes available, tool selection and ordering codes.

New additions are the **ArmaCoil** dimensions in their free state plus Prevailing Torque figures for Screw Lock Inserts.

Professional, workshop and thread repair kits are now included.



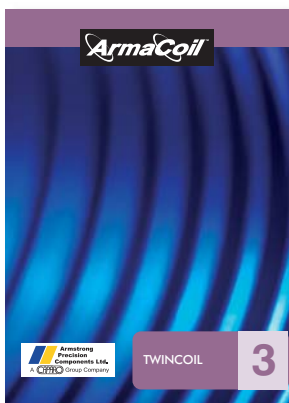
## 2 POWER TOOLING

High volume, high speed power installation is achievable with the **ArmaCoil** range of Pneumatic or Electrically Operated Power Tools.

Pneumatic Tooling can be hand held or bench mounted for increased production output, especially if 'tape feed' inserts are used.

Suitable for Free Running or Screw Locking **ArmaCoil** inserts.

The Electric Inserting Tool is a fully automatic tool which installs the **ArmaCoil** insert to depth and automatically reverses out in a single lever action.



## 3 TWINCOIL

**TwinCoil** inserts are two inserts, one inside the other, for the repair and/or recovery of stripped or off-centre tapped holes.

The 'outer' **TwinCoil** is always Free Running and the 'inner' can be either Free Running or Screw Locking.

Lengths are from 1.5D upwards, 1D inserts due to the shorter inner insert are not recommended.

**TwinCoil** Kits come complete with tap, Outer Inserting Tool and both Inner and Outer inserts. The Inner Inserting Tool is not included as it is a standard tool.

## CONTENTS

Introduction	3
Product Range	3
ArmaSert	4
ArmaSert Sonic I	5
ArmaSert Sonic II	6
ArmaSert Expansion	7
Performance Data	8
Performance Data	9
Specials	10
Notes	11



# Introduction

Armstrong Precision Components have produced Inserts for Plastic Mouldings for over 40 years. The stringent quality standards applied to the ArmaCoil wire thread insert, used extensively in the Aerospace industry, are reflected in the quality of our ArmaSerts.

## Product Range

### **ArmaSert**

The original Armstrong female threaded Brass Insert. A threaded insert with a knurled outside diameter suitable for cold push or hot installation into thermoplastic materials. The insert is symmetrical which lends itself to automatic bowl feeding and placement for increased production rates. Available in sizes from M2.5 to M6 and #4 to 1/4.



### **ArmaSert Sonic I**

ArmaSert Sonic I is made from a high strength grade of brass suitable for installation by Ultrasonic vibration or heat insertion. Counterbores at each end of the thread eliminate the risk of riveting the thread over during ultrasonic assembly. The symmetrical body design incorporates undercuts to enhance the pull-out strength. Designed to fit into a near parallel hole with a maximum taper of 0.05mm. Available in sizes from M2.5 to M6 and #4 to 1/4.



### **ArmaSert Sonic II**

A true Ultrasonic installation insert with knurls, undercuts and vanes to give maximum installation strength in moulded tapered holes. Each size is available in two body lengths, long and short, to give the designer greater flexibility in the choice of insert. Although designed for ultrasonic installation the insert can be installed using heat. Available in sizes from M2.5 to M6 and #4 to 1/4.



### **ArmaSert Expansion**

ArmaSert Expansion is a two-piece insert for use in thermoset plastics. The body of the insert is fitted with a small spreader plate which, when Depressed, forces the knurled portion into the parent material creating a high strength re-useable thread. Designed to fit in blind, flat bottomed holes, the installation is simple and requires no specialist tooling.



### **ArmaSert Specials**

Armstrong Precision Components manufacture a vast range of specially designed inserts to meet the requirements of individual customers. Our technical department is available to discuss your particular needs. See page 10 for guidelines on designing special inserts.





## Heat or Cold Installation

### Properties

- Knurled brass body internally threaded.
- Symmetrical design for automatic assembly.
- Pilot ends for accurate location.
- High pull-out and torque resistance.
- Fast installation.

## Product Data

### METRIC

THREAD SIZE	LENGTH (MM)	PRODUCT CODE	HOLE DIAMETER (MM)	MIN. HOLE DEPTH (MM)
M2.5 X 0.45	5.59	742318256	4.01 / 3.96	6.35
M3 X 0.5	4.75	742318322	4.01 / 3.96	5.50
M3 X 0.5	5.59	742320914	3.81 / 3.76	6.35
M3 X 0.5	5.59	742318314	4.01 / 3.96	6.35
M3.5 X 0.6	6.35	742318421	4.80 / 4.75	7.11
M3.5 X 0.6	7.11	742318439	4.80 / 4.75	7.87
M4 X 0.7	4.50	742318553	5.61 / 5.56	5.26
M4 X 0.7	7.11	742318538	5.61 / 5.56	7.87
M5 X 0.8	7.87	742318645	6.40 / 6.35	8.14
M6 X 1.0	9.50	742318678	8.03 / 7.98	10.29

### UNC

THREAD SIZE	LENGTH (INCH)	PRODUCT CODE	HOLE DIAMETER (INCH)	MIN. HOLE DEPTH (INCH)
4-40	0.220	742311111	0.158 / 0.156	0.250
6-32	0.205	742311202	0.189 / 0.187	0.235
6-32	0.250	742311210	0.189 / 0.187	0.280
6-32	0.280	742311236	0.189 / 0.187	0.310
8-32	0.205	742311319	0.221 / 0.219	0.235
8-32	0.280	742311327	0.221 / 0.219	0.310
8-32	0.323	742311343	0.221 / 0.219	0.353
10-24	0.310	742311434	0.252 / 0.250	0.340
10-24	0.375	742311442	0.252 / 0.250	0.405
¼ - 20	0.375	742318686	0.316 / 0.314	0.405

### UNF

THREAD SIZE	LENGTH (INCH)	PRODUCT CODE	HOLE DIAMETER (INCH)	MIN. HOLE DEPTH (INCH)
10-32	0.310	742312432	0.252 / 0.250	0.340
10-32	0.375	742312440	0.252 / 0.250	0.405

### HOLE SIZE

The hole sizes specified are for general guidance and may require slight adjustment to suit different materials or methods of installation. The design of the hole is parallel with a maximum of 0.05mm (0.002") moulding taper. We will be pleased to quote for non-standard lengths and thread forms.



## Heat or Ultrasonic Installation

### Properties

- Completely symmetrical body requiring minimal orientation.
- Spigot at each end providing initial location in the hole reducing the risk of misalignment.
- Reduced moulding assembly scrap through missing inserts.
- Ideal for automatic feeding and installation.
- Increased pull-out forces.
- High jack-out torque.

## Product Data

### METRIC

THREAD SIZE	LENGTH (MM)	PRODUCT CODE	HOLE DIAMETER (MM)	MIN. HOLE DEPTH (MM)
M2.5 X 0.45	5.8	74241781301	4.0	6.8
M3 X 0.5	5.8	74241781302	4.0	6.8
M3.5 X 0.6	7.2	74241781303	4.8	8.2
M4 X 0.7	8.2	74241781304	5.6	9.2
M5 X 0.8	9.5	74241781305	6.4	10.5
M6 X 1.0	12.7	74241781306	8.0	14.0

### UNC

THREAD SIZE	LENGTH (INCH)	PRODUCT CODE	HOLE DIAMETER (INCH)	MIN. HOLE DEPTH (INCH)
4-40	0.226	74241781501	0.157	0.268
6-32	0.281	74241781502	0.189	0.321
8-32	0.321	74241781503	0.220	0.362
1/4 - 20	0.500	74241781505	0.315	0.551

### UNF

THREAD SIZE	LENGTH (INCH)	PRODUCT CODE	HOLE DIAMETER (INCH)	MIN. HOLE DEPTH (INCH)
10-32	0.375	74241781405	0.252	0.413

### HOLE SIZE

Hole sizes specified are for general guidance. They may require slight variation to suit the plastic material and different methods of moulding. The design of the hole is parallel with a maximum of 0.05mm (0.002") moulding taper.

### WALL THICKNESS

Minimum wall thickness required for maximum assembled strength is 50% of the hole diameter for most materials.

Pre-production trials are recommended.

We will be pleased to quote for non-standard lengths and thread forms.



## Ultrasonic Installation

### Properties

- Designed to fit moulded tapered holes.
- Knurled and vaned brass body internally threaded.
- Specially designed for ultrasonic installation.
- Providing high pull-out and torque resistance.
- Rapid installation.
- Special design permits automatic feeding.
- Lends itself to heat installation in many materials.

## Product Data

### METRIC

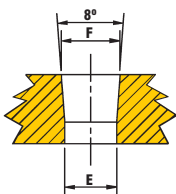
THREAD SIZE	LENGTH (MM)		PRODUCT CODE	DIAMETER A (MM)	DIAMETER B (MM)	HOLE SIZE		
	LONG (MM)	SHORT (MM)				DIA. E (MM)	DIA. F (MM)	MIN DEPTH (MM)
M2.5X0.45	5.56		742501310	4.37	3.71	3.61/3.56	4.06/4.01	6.32
M2.5X0.45		3.43	742501307	4.37	3.99	3.91/3.86	4.06/4.01	4.19
M3X0.5	6.35		742501331	5.56	4.83	4.72/4.67	5.26/5.21	7.11
M3X0.5		3.81	742501349	5.56	5.16	5.08/5.03	5.26/5.21	4.57
M3.5X0.6	6.35		742501372	5.56	4.83	4.72/4.67	5.26/5.21	7.11
M3.5X0.6		3.81	742501380	5.56	5.16	5.08/5.03	5.26/5.21	4.57
M4X0.7	7.92		742501414	6.35	5.41	5.31/5.26	5.97/5.92	8.69
M4X0.7		4.70	742501422	6.35	5.84	5.77/5.72	5.97/5.92	5.46
M5X0.8	11.13		742501455	8.33	7.19	7.09/7.04	8.03/7.98	11.89
M5X0.8		6.73	742501463	8.33	7.82	7.72/7.67	8.03/7.98	7.49
M6X1.0	12.70		742501497	9.53	8.43	8.18/8.13	9.25/9.19	13.46
M6X1.0		7.62	742501500	9.53	8.99	8.89/8.84	9.25/9.19	8.38

### UNC

THREAD SIZE	LENGTH (MM)		PRODUCT CODE	DIAMETER A (INCH)	DIAMETER B (INCH)	HOLE SIZE		
	LONG (INCH)	SHORT (INCH)				DIA. E (INCH)	DIA. F (INCH)	MIN DEPTH (INCH)
4-40	0.219		742500374	0.172	0.146	0.142/0.140	0.160/0.158	0.249
4-40		0.135	742500382	0.172	0.157	0.154/0.152	0.160/0.158	0.165
6-32	0.250		742500473	0.219	0.190	0.186/0.184	0.207/0.205	0.280
6-32		0.150	742500465	0.219	0.203	0.200/0.198	0.207/0.205	0.180
8-32	0.312		742500531	0.250	0.213	0.209/0.207	0.235/0.233	0.342
8-32		0.185	742500549	0.250	0.230	0.227/0.225	0.235/0.233	0.215
10-24	0.375		742500610	0.297	0.251	0.247/0.245	0.278/0.276	0.405
10-24		0.225	742500615	0.297	0.272	0.268/0.266	0.278/0.276	0.225
1/4-20	0.500		742500739	0.375	0.332	0.322/0.320	0.364/0.362	0.530
1/4-20		0.300	742500741	0.375	0.354	0.350/0.348	0.364/0.362	0.330

### UNF

THREAD SIZE	LENGTH (MM)		PRODUCT CODE	DIAMETER A (INCH)	DIAMETER B (INCH)	HOLE SIZE		
	LONG (INCH)	SHORT (INCH)				DIA. E (INCH)	DIA. F (INCH)	MIN DEPTH (INCH)
10-32	0.375		742500614	0.297	0.251	0.247/0.245	0.278/0.276	0.405
10-32		0.225	742500621	0.297	0.272	0.268/0.266	0.278/0.276	0.255
1/4-28	0.500		742500710	0.375	0.332	0.322/0.320	0.364/0.362	0.530
1/4-28		0.300	742500715	0.375	0.354	0.350/0.348	0.364/0.362	0.330



### HOLE SIZE

A tapered hole is specified for easier mould release and more accurate positioning of the insert. The E and F diameters tabulated are suggested for general types of thermoplastics. Specific applications may require variations to these figures which should be established by production trials.



## Thermoset Insert

### Properties

- Suitable for thermoset plastics.
- Knurled brass body internally threaded.
- Integral spreader plate for positive fixing.
- High strength re-usable thread.
- Fast economical assembly.
- For use in blind holes.

## Product Data

### METRIC

THREAD SIZE	INSERT LENGTH (MM)	THREAD LENGTH (MM)	PRODUCT CODE	BODY DIAMETER (MM)	MANUAL TOOL	SEMI-AUTO TOOL
M3X0.5	6.35	4.78	741154215	3.96	748100062	748300134
M3.5X0.6	7.95	6.38	741157218	4.78	748100252	748300035
M4X0.7	7.95	6.38	741160212	5.56	748100310	748300068
M4X0.7	9.50	7.95	741160618	5.56	748100336	748300068
M5X0.8	9.50	7.95	741164610	6.35	748100443	748300076
M6X1.0	12.70	11.13	741168215	7.95	748100500	748300100

### UNC

THREAD SIZE	INSERT LENGTH (INCH)	THREAD LENGTH (INCH)	PRODUCT CODE	BODY DIAMETER (INCH)	MANUAL TOOL	SEMI-AUTO TOOL
4-40	0.250	0.188	741110217	0.156	748100039	748300019
5-40	0.313	0.250	741111512	0.188	748100104	748300027
6-32	0.313	0.250	741112510	0.188	748100161	748300043
6-32	0.375	0.313	741112718	0.188	748100187	748300043
8-32	0.313	0.250	741113518	0.219	748100310	748300068
8-32	0.375	0.313	741113716	0.219	748100336	748300068
10-24	0.375	0.313	741114714	0.250	748100419	748300076
10-24	0.438	0.375	741114813	0.250	748100427	748300076
¼-20	0.500	0.438	741115919	0.313	748100500	748300100

### UNF

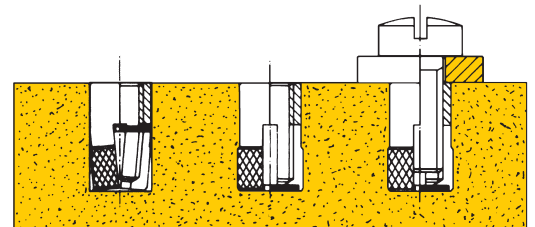
THREAD SIZE	INSERT LENGTH (INCH)	THREAD LENGTH (INCH)	PRODUCT CODE	BODY DIAMETER (INCH)	MANUAL TOOL	SEMI-AUTO TOOL
10-32	0.313	0.250	741120513	0.250	748100435	748300076
10-32	0.375	0.313	741120711	0.250	748100443	748300076
10-32	0.438	0.375	741120810	0.250	748100468	748300076

### HOLE SIZE

Hole preparation can be drilled or moulded. The diameter should not exceed 0.05mm (0.002") above the body diameter of the insert. Any moulding taper should also be within these limits. The base of the hole should be flat bottomed with at least ½ the insert diameter of material below. Hole depth should equal the length of insert. A minimum wall thickness of 2/3 body diameter is recommended. Certain applications may tolerate thinner wall sections.

### SEATING PRINCIPLE

- Place the insert into the hole and ensure it is pushed down to depth.
- Depress the spreader plate using the correct tool until the spreader is fully seated.
- The knurled portion of the body is forced outwards creating high frictional retention.



Many tests can be performed on assembled inserts to establish their performance capabilities.

The two tests that ArmaSert inserts have been subjected to are:-

- **Tensile** – the ability of the insert to withstand a straight pull load before failure.
- **Jack-out** – the rotational force which will cause the insert to turn or pull out of the hole.

These tests were performed in our own laboratory and give general guidelines for insert selection.

## ArmaSert TENSILE (N)

SIZE	MATERIAL	INSTALLATION METHOD	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4	SAMPLE 5
M3 X 5.59	PERSPEX	ULTRASONIC	1846	1912	1801	1934	1868
		HEAT	3248	3108	2969	3148	3019
	ABS	ULTRASONIC	756	756	734	711	734
		HEAT	845	889	911	934	845
M4 X 7.11	PERSPEX	ULTRASONIC	3856	3666	3487	3786	3905
		HEAT	5679	6107	5958	5699	5520
	ABS	ULTRASONIC	1255	1275	1275	1265	1125
		HEAT	1833	2012	1893	1933	1982
M6 X 9.5	PERSPEX	ULTRASONIC	6038	6556	6556	6277	6028
		HEAT	10810	10711	10362	10561	10412
	ABS	ULTRASONIC	1813	1933	1893	2002	2132
		HEAT	3357	3218	3337	3437	3616

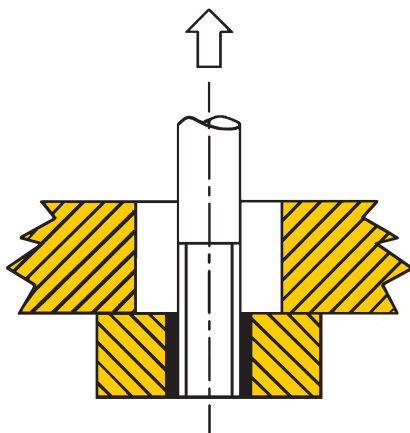
## JACK-OUT (Nm)

SIZE	MATERIAL	INSTALLATION METHOD	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4	SAMPLE 5
M3 X 5.59	PERSPEX	ULTRASONIC	1.412	1.243	1.186	1.356	1.130
		HEAT	1.695	1.469	1.582	1.469	1.695
	ABS	ULTRASONIC	0.678	0.960	1.130	1.243	1.130
		HEAT	0.678	0.565	0.678	0.734	0.791
M4 X 7.11	PERSPEX	ULTRASONIC	2.486	3.107	2.825	3.390	3.390
		HEAT	2.712	3.954	4.519	3.954	3.954
	ABS	ULTRASONIC	1.356	1.356	1.638	1.469	1.808
		HEAT	2.260	2.488	3.390	3.672	3.672
M6 X 9.5	PERSPEX	ULTRASONIC	6.779	6.214	6.214	7.344	6.779
		HEAT	16.948	16.948	16.948	16.948	16.948
	ABS	ULTRASONIC	3.390	3.107	2.542	2.825	2.825
		HEAT	7.344	5.649	7.344	6.779	6.779

### TENSILE

The force in Newtons (N) required to pull the insert out of the material.

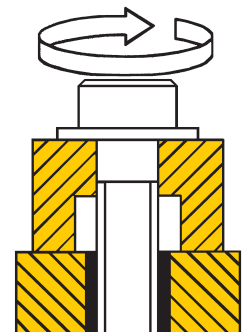
The insert is pulled through a hole considerably larger than the diameter of the insert.



### JACK-OUT

The torque required in Newton Metres (Nm) to cause the insert to turn in the moulding.

As with the Tensile test the clamped member does not enhance the performance figures.



These tests give an indication of the retention properties between the moulding and the insert.

## ArmaSert Sonic I TENSILE (N)

SIZE	MATERIAL	INSTALLATION METHOD	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4	SAMPLE 5
M4 X 8.2	NYLON 66	HEAT	3334	3610	3375	3437	3246
		ULTRASONIC	2307	2659	2614	2472	2617
	ABS	HEAT	3326	3204	3027	2967	3265
M5 X 9.5	NYLON 66	HEAT	4242	4575	4306	4256	5177
		ULTRASONIC	3160	3179	2830	3316	3018
	ABS	HEAT	3960	3741	3460	3811	3981
M6 X 12.7	NYLON 66	HEAT	7249	6590	7439	7772	7144
		ULTRASONIC	5538	5175	5524	6029	6394
	ABS	HEAT	6603	6953	7443	7458	7137

## JACK-OUT (Nm)

SIZE	MATERIAL	INSTALLATION METHOD	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4	SAMPLE 5
M4 X 8.2	NYLON 66	HEAT	2.95	2.90	3.30	2.90	3.25
		ABS	1.70	1.40	1.50	1.55	1.85
M5 X 9.5	NYLON 66	HEAT	3.00	3.20	4.00	4.10	3.95
		ABS	2.70	2.60	2.25	2.55	2.45
M6 X 12.7	NYLON 66	ULTRASONIC	7012	6567	6438	5931	7053
		HEAT	6.80	7.00	5.60	7.80	5.80
	ABS	HEAT	5.90	5.10	4.30	4.00	3.50

## ArmaSert Sonic II TENSILE (N)

SIZE	MATERIAL	INSTALLATION METHOD	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4	SAMPLE 5
M3 X 6.35	PERSPEX	ULTRASONIC	3885	3945	3836	3866	3866
		HEAT	2889	2550	2550	3048	3288
	ABS	ULTRASONIC	1112	1112	1112	1089	1089
		HEAT	1023	1089	1112	1045	1045
M4 X 7.92	PERSPEX	ULTRASONIC	4085	3786	4184	3945	4145
		HEAT	5460	6078	4424	5878	5709
	ABS	ULTRASONIC	1846	1833	1793	1793	1863
		HEAT	1673	1574	1654	1703	1574
M6 X 12.70	PERSPEX	ULTRASONIC	10013	9964	9615	9914	9764
		HEAT	11010	10910	11159	11109	10810
	ABS	ULTRASONIC	3387	3387	3288	3417	3457
		HEAT	2869	2929	3019	3048	2550

## JACK-OUT (Nm)

SIZE	MATERIAL	INSTALLATION METHOD	SAMPLE 1	SAMPLE 2	SAMPLE 3	SAMPLE 4	SAMPLE 5
M3 X 6.35	PERSPEX	ULTRASONIC	2.542	2.825	3.107	2.825	2.825
		HEAT	1.808	1.921	2.147	2.304	1.977
	ABS	ULTRASONIC	1.695	1.469	1.130	1.130	1.017
		HEAT	1.017	0.847	1.017	0.791	0.847
M4 X 7.92	PERSPEX	ULTRASONIC	6.214	5.932	5.649	5.649	5.084
		HEAT	5.084	4.519	4.802	4.519	4.519
	ABS	ULTRASONIC	3.390	2.825	3.672	3.107	3.390
		HEAT	2.260	3.107	2.825	2.825	3.390
M6 X 12.70	PERSPEX	ULTRASONIC	11.298	11.298	9.886	11.298	11.298
		HEAT	11.298	12.428	12.428	14.123	14.123
	ABS	ULTRASONIC	3.954	4.237	3.954	4.519	3.954
		HEAT	3.446	3.672	4.237	3.954	4.237

## Armstrong Precision Components can produce special inserts to customer designs.

Our Technical staff are available to assist in the selection and design of the insert.



## Design Guidelines

### INSTALLATION METHODS

- Moulded-in. For maximum strength.
- Ultrasonic. Fast, high strength post moulded installation but equipment cost high.
- Heat. Good post moulded strength with less expensive equipment.
- Cold. Lower moulded strength relying on friction retention but minimal equipment cost.

### INSERT DESIGN

- Class of thread. 6H for Metric  
3B for Unified
- Diamond Knurled Body to prevent rotation.
- Undercuts for good pull-out resistance.
- Knife-edge vanes for pull-out in harder materials.
- Pilot ends for location in the hole reducing alignment problems.
- Threads counter-bored at each end for ultrasonic installation (threads can be riveted over during installation).
- Cold or heat inserts have countersinks for improved screw engagement.

### IMPROVING PERFORMANCE

- Cold installation will not benefit from undercuts (solid plastic cannot flow into grooves).
- Diamond knurls will resist rotation (torque) and pull-out.
- Increasing the coarseness of the knurl may not increase the performance. The softened plastic will not always flow completely to fill the valleys of the knurl.
- Additional heat or dwell time during installation can reduce the strength properties of the plastic.
- Straight knurls will give maximum resistance to torque but no resistance to pull-out.
- Undercuts give maximum resistance to pull-out but no resistance to rotation.
- The best compromise is a combination of diamond knurls and undercut(s).
- Deeper or wider undercuts may not improve the performance as the displaced plastic cannot completely fill the voids.



## Product Quality Assurance

**Armstrong Precision Components Ltd is approved to:**

ISO9001: 2000 Plus AS9100 Rev B      CERT No: FM00049

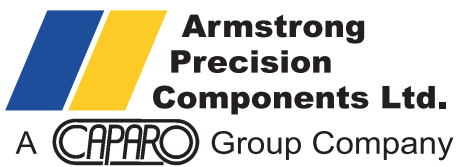
ISO14001: 2004                              CERT No: EMS507767

OHSAS 18001: 1999                        CERT No: OHS507769

Investor In People



INVESTOR IN PEOPLE



**Armstrong Precision Components Ltd**

Stoneferry Business Park, Foster Street, Hull HU8 8BT United Kingdom

<b>Main</b>	<b>t:</b> +44 (0)1482 325425	<b>f:</b> +44 (0)1482 327229
<b>Sales</b>	<b>t:</b> +44 (0)1482 591569	<b>f:</b> +44 (0)1482 326986
<b>Accounts</b>	<b>t:</b> +44 (0)1482 591589	
<b>Technical</b>	<b>t:</b> +44 (0)1482 591579	<b>f:</b> +44 (0)1482 591576

**e:** [info@apc-caparo.com](mailto:info@apc-caparo.com) **w:** [www.apc-caparo.com](http://www.apc-caparo.com)

