Heat Shrink Assembly Technology
Heat Shrink Assembly from EMAG is primarily used in the manufacture of high-precision powertrain components. It also works well with workpieces that are subject to high torque rates and very dynamic loads. Throughout the continuing development of its systems EMAG is focusing on the individual solution. Heat Shrink technology leads to a significant reduction in component weight and a high degree of functional density.
Heat Shrink Assembly Technology.

This technology is a production technique that does not need more processing. Whether control cams or gears have to be matched with shafts or shafts need to be fitted into housings, the heat shrink technique is a safe and continuous process. The advantage of EMAG’s technology lies in the preheating unit, which is geometrically matched to the workpiece and features an essential temperature control. EMAG’s patented system is used to join complex precision components. This technology can be applied, especially in the manufacture of shafts.

The advantages of Heat Shrink Assembly:
- A high degree of precision that requires no post-processing operation
- Component weight reductions which leads to savings in material
- No component deformation after joining
- It is possible to join diverse materials
- Freely selectable component sequences
- Freely selectable angular and axial positions
- In case of product changes, resetting is quick

The process.

State                     | Component
-------------------------|-----------------------------------------------------
cold                     | Hub, precision component, machined with shrink-on allowance
preheated                | Hub preheated, joining clearance 0.015 mm
joined and positioned    | Hub and shaft joined – form fit

Shaft, precision component
Method 1 – Shaft fitted into hub.

Method 2 – Hub fitted onto shaft.
The joining process for composite camshafts.

EMAG’s Heat Shrink Assembly is characterized by a stress-free joining process. The best combination of a robot and specially designed gripper system make it possible to work with a joining clearance of < 15 μm. The flexibility of this concept allows for greater freedom in the design of camshafts and has its advantage in medium batch production with frequent resetting to accommodate different shafts. The Heat Shrink Assembly process combines flexibility and productivity, as the user benefits from constructional, production-specific freedom and from short cycle times. While one cam is fitted, the next one is already being preheated. By equipping the joining machine with a number of preheating units the process can be scaled to suit specific requirements.

The advantages composite camshafts provide:

- A reduction in costs
- A reduction in component weight
- The cams can be of different materials
- Greater flexibility in production
- New cam geometries, such as negative radii, can easily be accommodated

Camshafts for passenger cars
Reducing the number of downstream operations:
The high precision of the composite camshaft allows for the cam contour grinding operation to be drastically reduced, or – where precision cams are employed – eliminated altogether. Another advantage in using this method is the possibility to combine different materials in the manufacture of the shaft. For instance, forged cams (e.g. in 100Cr6) can be used alongside sinteredcams that do not call for a subsequent grinding operation.

Ancillary components, such as plugs or endpieces, can – just like the shaft itself – be made of more advantageous materials. This allows for the camshaft to be designed to suit the requirements of the particular engine and to be optimized concerning loading capacity and manufacturing costs.
Heat Shrink Assembly of gear shafts ensure that they are compact and have a high degree of functional density, as the gears can be brought right up close to the shoulders. This ensures that shaft variations are easy to manufacture. And the use of hollow shafts meets the demands for weight reduction. Rotating mass is reduced significantly, without any negative effect on the shaft’s resilience.

Thermal joining technology offers design engineers new opportunities to ensure that gear shafts are compact, lightweight and of the right functional density. The results are individual solutions for every requirement.
Preheating systems AWG.

The advantages:
- Component-matching system geometries for optimal heat transfer
- The joining temperature remains constant throughout the process
- Individually controlled preheating units
- State-of-the-art measuring and control technology guarantees minimal energy consumption and accurate temperature control
- Simple to operate; with maximum process integrity assured

Technical data:
- Power supply: CEE-plug (5-pole, 16 A) / shockproof plug
- Protection class: mechanics IP40, electrics IP54
- Application-dependent parameters: cycle time, heat output and preheating time per component
- Choice of housings: W x D x H (standard)
  a) 500 x 500 x 400 mm
  b) 700 x 500 x 400 mm
  c) 900 x 500 x 400 mm
  (dependent on workpiece size)
- Preheating unit:
  a) up to 40 mm internal diameter
  b) > 40 mm to 70 mm internal diameter
  c) > 70 mm to 120 mm internal diameter
The way to the best machining solution begins with great preparation, i.e. the definition and selection of the proper technology. We offer a competent advisory service in all questions concerning our Heat Shrink Assembly process and will create a customized comprehensive concept that covers everything from workpiece and technology to machining sequence optimization and assembly parameters / sequence.

- Checking the possibility to join specific workpieces and assemblies
- Checking tolerances and establishing the way to join the workpieces
- Identifying geometric details and surface finish
- Calculating transmissible torque and axial forces
- Design changes between existing components and composite version
- Support in product development, with a view to the joining capabilities of the EMAG process
- Identification of the appropriate preheating technology

Prototyping / laboratory.

From prototyping to the testing of new developments – the EMAG heat shrink laboratory analyzes component geometries with the focus on defining the optimal cost-benefit ratio.

- Construction of prototypes for initial sample inspection
- Production of a pilot series
- Establishing transmissible moments
- Cycle time studies
- Establishing an achievable machine capability
Contact us. Now.

EMAG
Gruppen-Vertriebs- und Service GmbH
Salach
Austrasse 24
73084 Salach
Germany
Phone: +49 7162 17-0
Fax: +49 7162 17-820
E-mail: info@salach.emag.com

Frankfurt
Martin-Beheim-Strasse 12
63263 Neu-Isenburg
Germany
Phone: +49 6102 88245-0
Fax: +49 6102 88245-412
E-mail: info@frankfurt.emag.com

Cologne
Robert-Pétriel-Strasse 79
50739 Köln
Germany
Phone: +49 7162 17-0
Fax: +49 7162 17-820
E-mail: info@koeln.emag.com

Leipzig
Pitterstrasse 26
04159 Leipzig
Germany
Phone: +49 341 4666-0
Fax: +49 341 4666-014
E-mail: info@leipzig.emag.com

Munich
Zandorferstrasse 100
81677 München
Germany
Phone: +49 89 99886-250
Fax: +49 89 99886-285
E-mail: info@muENCHEN.emag.com

Austria
Glanensteinstrasse 1
5400 Halten
Austria
Phone: +43 6254 76023-0
Fax: +43 6254 76023-20
E-mail: info@europa.austria.emag.com

Danmark
Horsvangen 31
7120 Vejle Ø
Denmark
Phone: +45 75 854854
Fax: +45 75 852764
E-mail: info@daenemark.emag.com

Sweden
Glasgatan 19B
73130 Köping
Sweden
Phone: +46 221 40305
Fax: +46 221 40206
E-mail: info@sweden.emag.com

Poland
ERALL Poland
ul. Elektoralna 19/B
00-137 Warsaw
Poland
Phone: +48 022 392 2770
Fax: +48 022 392 2771
E-mail: j.tomczak@erall.pl

Czech Republic
Lolakova 766
103 00 Praha 10 – Kolovraty
Czech Republic
Phone: +420 731 476070
Fax: +420 731 476079
E-mail: info@emag.com

Russia
ul. Akademika Chelomeya 3/2
117630 Moscow
Russia
Phone: +7 495 287 0960
Fax: +7 495 287 0961
E-mail: info@russia.emag.com

Belgium
ul. Timiriaseva, 65 B, Office 1101
220035 Minsk
Belgium
Phone: +375 17 2547370
Fax: +375 17 2547370
E-mail: info@emag.by

EMAG DO BRASIL Ltda.
Rua Schilling, 413
Vila Leopoldinópolis
05302-001 São Paulo
SP Brazil
Phone: +55 11 38370145
Fax: +55 11 38370145
E-mail: info@brasil.emag.com

EMAG INDIA Pvt. Ltd.
Technology Centre
No. 17/G/46-3, Industrial Suburb, 2nd Stage, Yeshwanthpur,
Bangalore – 560 022
India
Phone: +91 80 42544400
Fax: +91 80 42544444
E-mail: info@india.emag.com

EMAG SOUTH AFRICA
PO. Box 2900
Kempton Park 1620
Rep. South Africa
Phone: +27 11 39350-70
Fax: +27 11 39350-64
E-mail: info@southafrica.emag.com

EMAG Machine Tools (Taicang) Co., Ltd.
Building 3, Cang Neng
Europe & American Technology Park
No. 8 Lou Jiang Rd. (N.)
215400 Taicang
JP, China
Phone: +86 512 5357-5399
Fax: +86 512 5357-6395
E-mail: info@china.emag.com

EMAG KOREA Ltd.
Rm204, Biz center,
SKn Technopark, 124 Sagimakgol-ro,
Sangdaewon-dong, Joongwon-gu,
Seongnam City,
Gyeonggi-do, 462-721,
South Korea
Phone: +82 31 776-4415
Fax: +82 31 776-4419
E-mail: info@korea.emag.com

TAKAMAZ EMAG Ltd.
1-8 Asahigaoka Hakusan-City
Ishikawa Japan, 924-0004
Japan
Phone: +81 31 878-8580
Fax: +81 31 878-8580
E-mail: info@takamaz.emag.com

ZETA EMAG Srl
Viale Longarone 41/A
20080 Zibido S.Giacomo (MI)
Italy
Phone: +39 02 905942-1
Fax: +39 02 905942-11
E-mail: info@zeta.emag.com

EMAG (UK) Ltd.
Cheestnut House,
Kingswood Business Park
Holyhead Road
Albrighton
Wolverhampton WV7 3AU
Great Britain
Phone: +44 1902 37609-0
Fax: +44 1902 37609-1
E-mail: info@uk.emag.com

EMAG L.L.C. USA
38800 Grand River Avenue
Farmington Hills, MI 48335
USA
Phone: +1 248 477-7440
Fax: +1 248 477-7784
E-mail: info@usa.emag.com

EMAG MEXICO
Colina de la Umbria 10
53140 Boulevares
Naucalpan Edo. de Mexico
Mexico
Phone: +52 55 5374266-5
Fax: +52 55 5374266-4
E-mail: info@mexico.emag.com

EMAG INDUSTRIE
2, Parc des Fontenelles
78870 Bailly FRANCE
Phone: +33 130 8047-70
Fax: +33 130 8047-69
E-mail: info@nodier.emag.com

EMAG MACINAS HERRAMIENTA S.L.
Pasaje Arrahona, nº 1B
Polígono Industrial Santiga
08210 Barberà del Vallès (Barcelona) Spain
Phone: +34 93 7195080
Fax: +34 93 7297107
E-mail: info@emh.emag.com

Subject to technical changes.235-1-GB/09.2013 · Printed in Germany · © Copyright EMAG ·

At home in the world.

www.emag.com