
최근 단조기술의 동향

제4회 단조심포지움

1999년6월 18일 (금)

한국기계연구원 창원분원

金 炫琪

Yamanaka Eng. Co., Ltd.

990519-2-1

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**Pioneer of Cutting-edge Technologies
in Precision Forming**

概要

鍛造技術発展の推移

最近の鍛造技術開発の動向

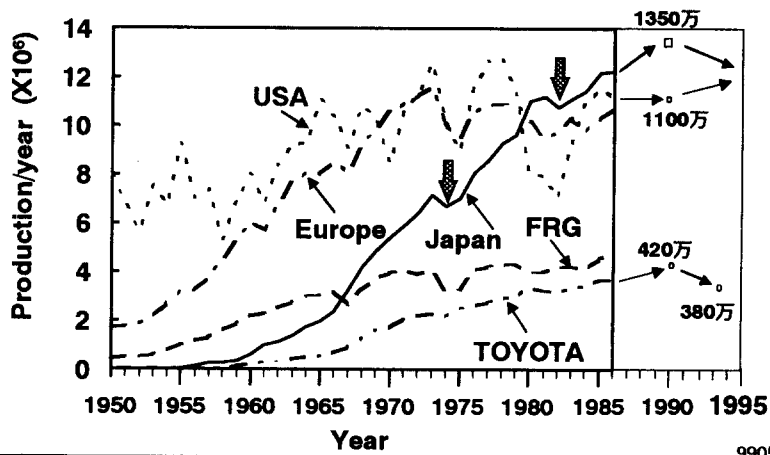
今後の鍛造技術開発

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世界自動車生産推移

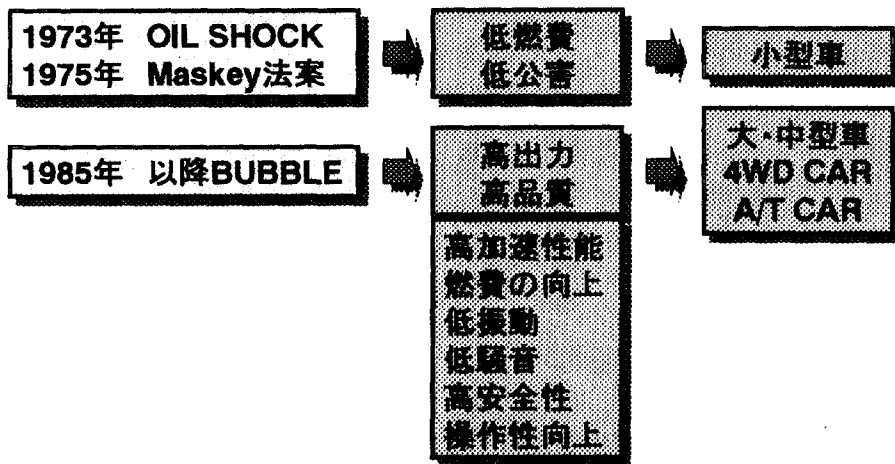


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自動車業界の環境変化と鍛造(1)

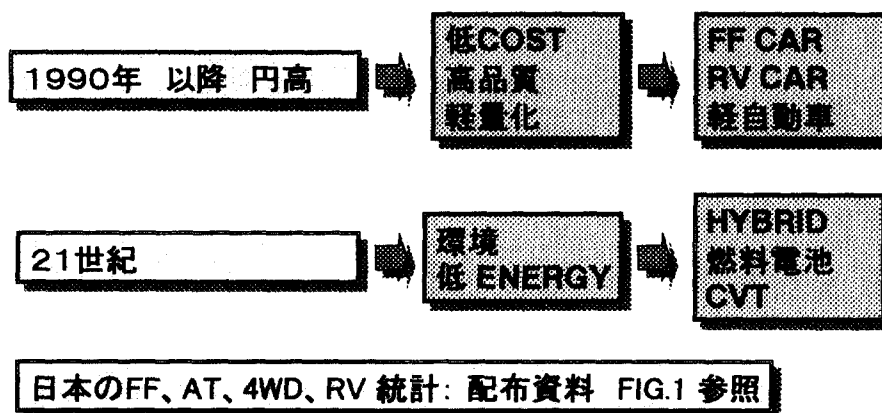


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自動車業界の環境変化と鍛造(2)



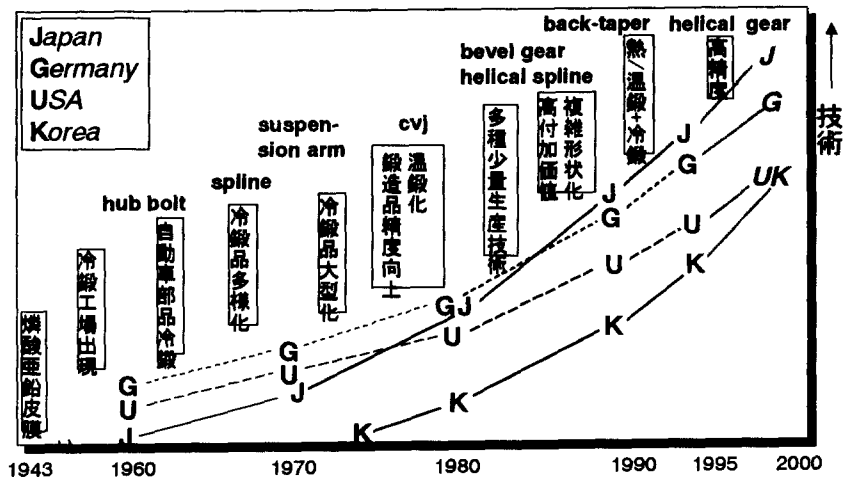
日本のFF、AT、4WD、RV 統計: 配布資料 FIG.1 参照

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鍛造技術の発展推移

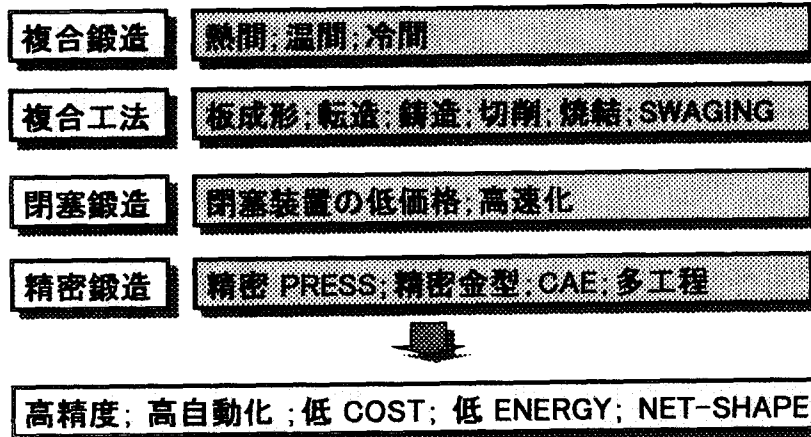


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最近の鍛造技術動向



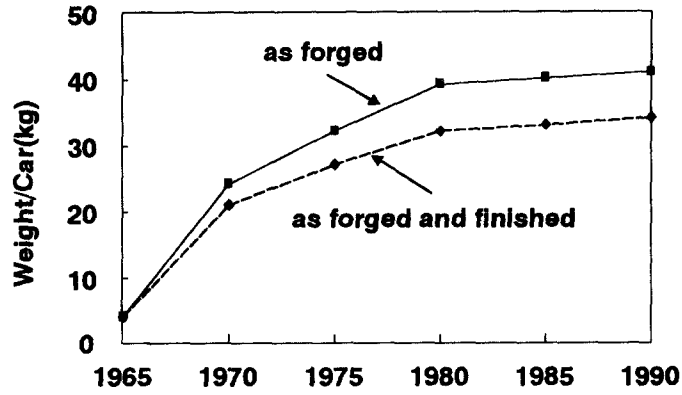
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冷間鍛造部品の使用量

TOYOTA

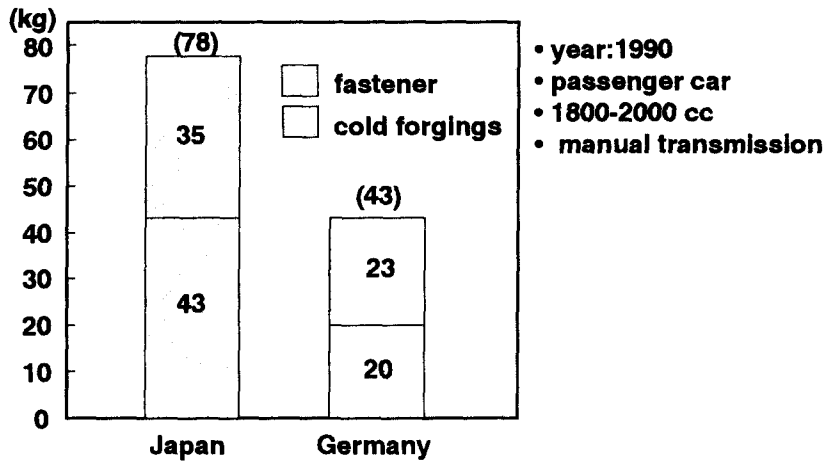


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冷間鍛造部品の使用量



- year:1990
- passenger car
- 1800-2000 cc
- manual transmission

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自動車用鍛造部品の例

熱間・温間鍛造品

配布資料 FIG.2(図3) 参照

冷間鍛造品

配布資料 FIG.2(図4) 参照

焼結(鍛造)品

配布資料 FIG.2(図5) 参照

歯形の鍛造品

配布資料 FIG.3 参照

最新の焼結部品

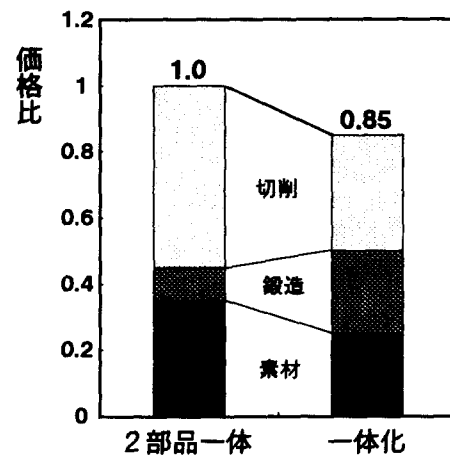
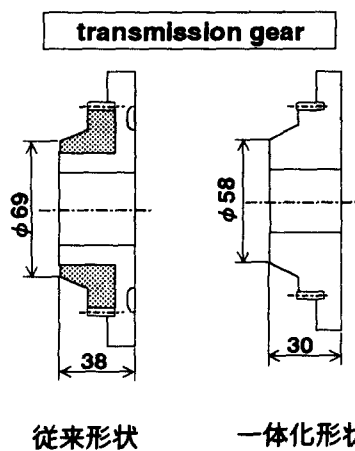
配布資料 FIG.4 参照

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複数部品の一体化



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NET-SHAPE鍛造の課題

高精度の金型

金型製造技術

鍛造成形時の材料流れ制御

CAEの活用技術

鍛造品の精度測定・品質保証

鍛造品測定技術

鍛造品の加工基準設定と切削

鍛造品・治具設計技術

熱処理による変形量低減

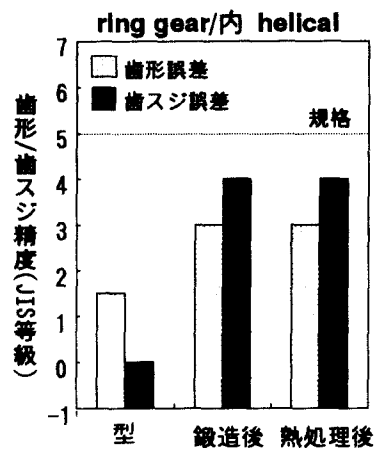
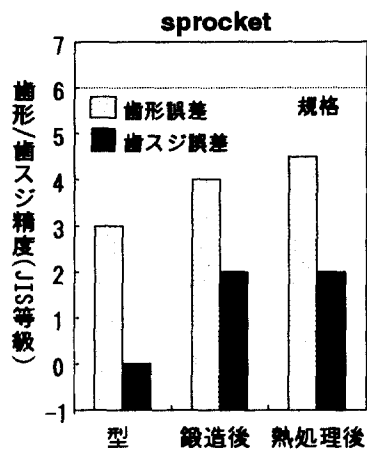
鍛造材開発技術

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金型と製品の精度



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鍛造と切削の組み合わせ

配布資料 FIG. 5 参照

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鍛造工法の工夫：背圧

配布資料 FIG. 6 参照

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鍛造品の精度測定・品質保証

配布資料 FIG. 7 参照

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熱処理による変形量低減

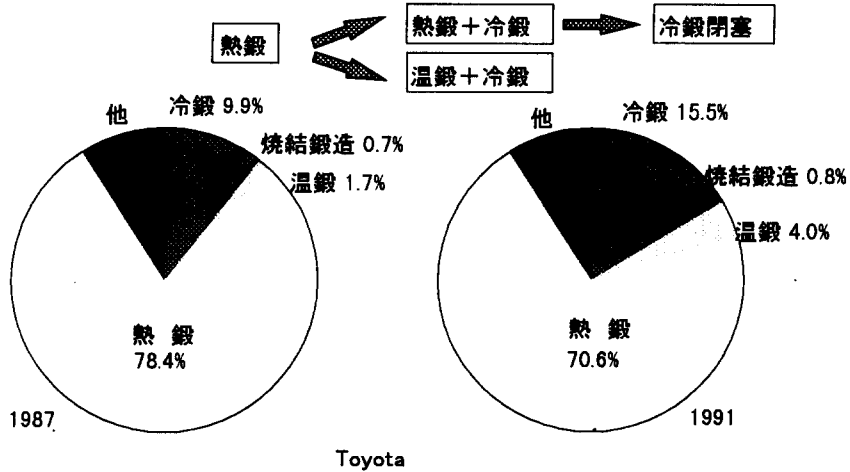
配布資料 FIG. 8 参照

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自動車部品の冷・温間鍛造化

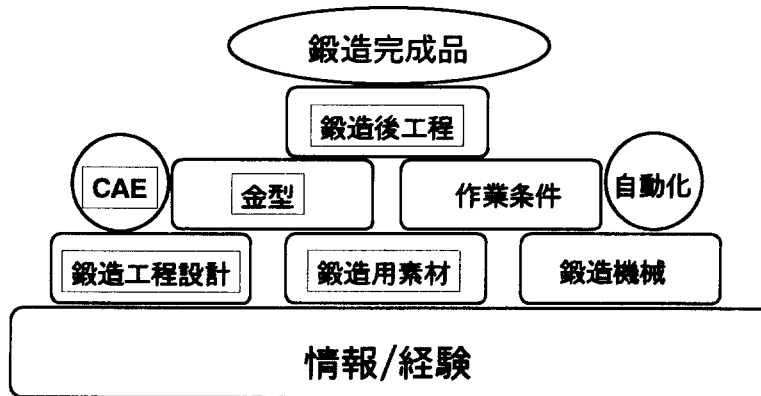


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鍛造技術の要素



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今後の鍛造技術の方向

環境

- 軽量化
- 省工本化
- 切削工程の削減

材質

- 高強度非調質鋼
- 鍛造用素材

製造工法

- 他工法との融合
- 精密金型
- 精密 PRESS
- 多品種少量鍛造

FE 解析

- 工程の最適化
- 金型寿命予測

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감사합니다.

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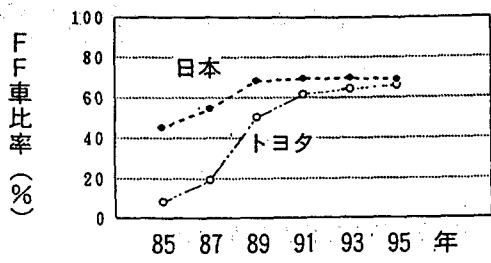


図3 日本のFF車の比率 (除トラック商用車)

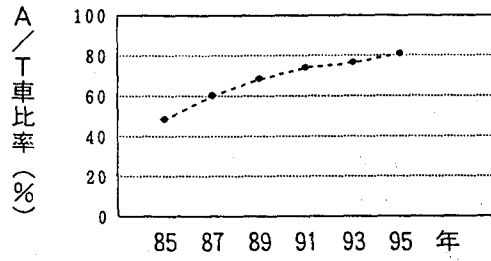


図4 日本のA/T乗用車の比率 (除軽)

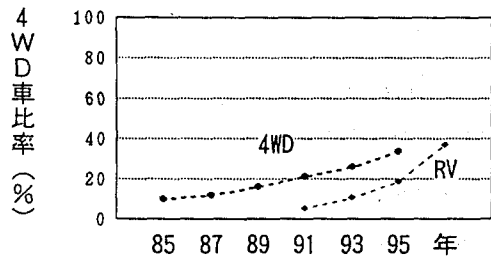


図5 日本の4WD乗用車の比率 (除軽)

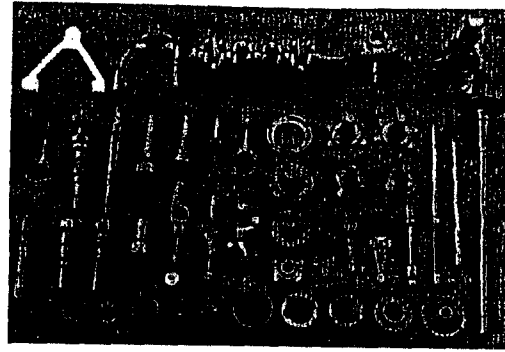


図3 熱間・温間鍛造部品

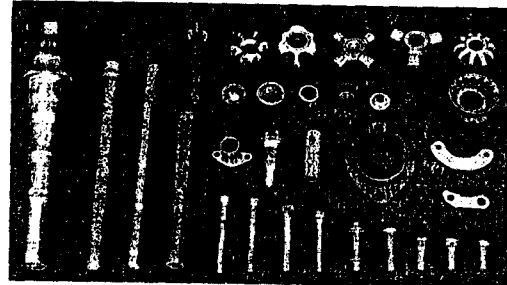


図4 冷間鍛造部品

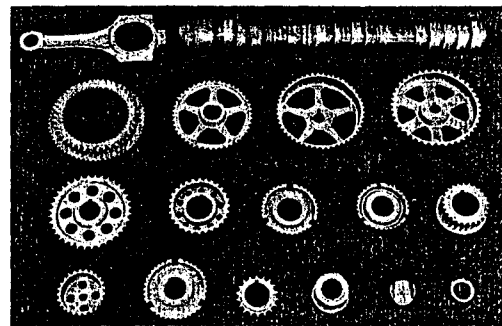


図5 焼結部品

FIG.1

FIG.2

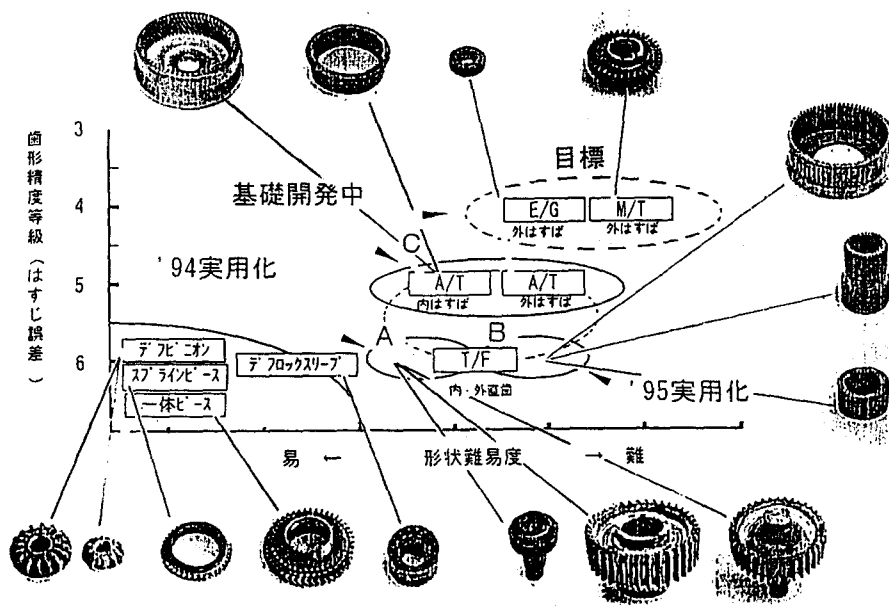


FIG.3

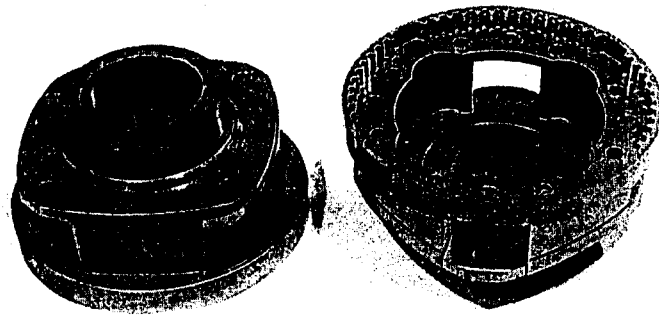


写真5 接合焼結キャリア

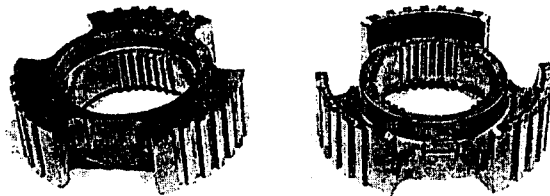


写真6 高強度焼結ネットシェイブ ハブ

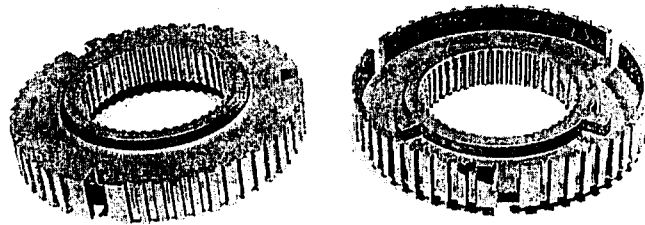


写真7 ネットシェイブハブ

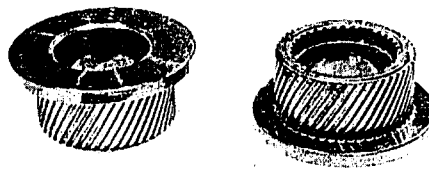


写真8 内外逆位相ヘリカルギヤ

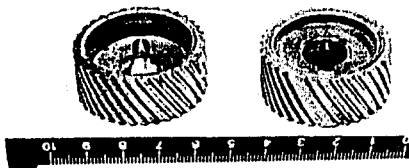
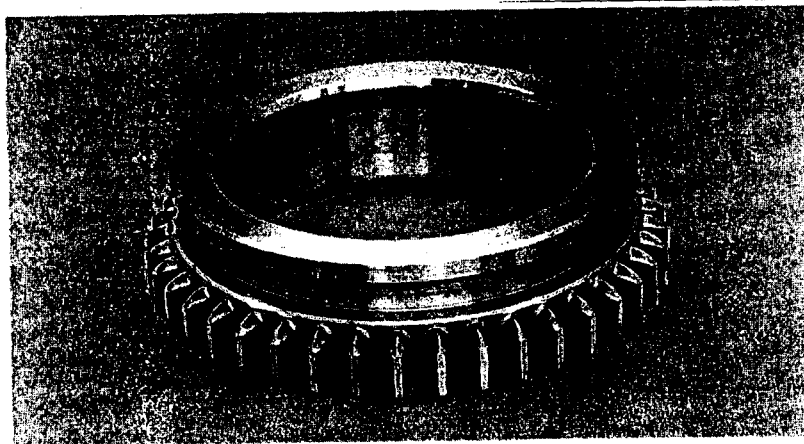
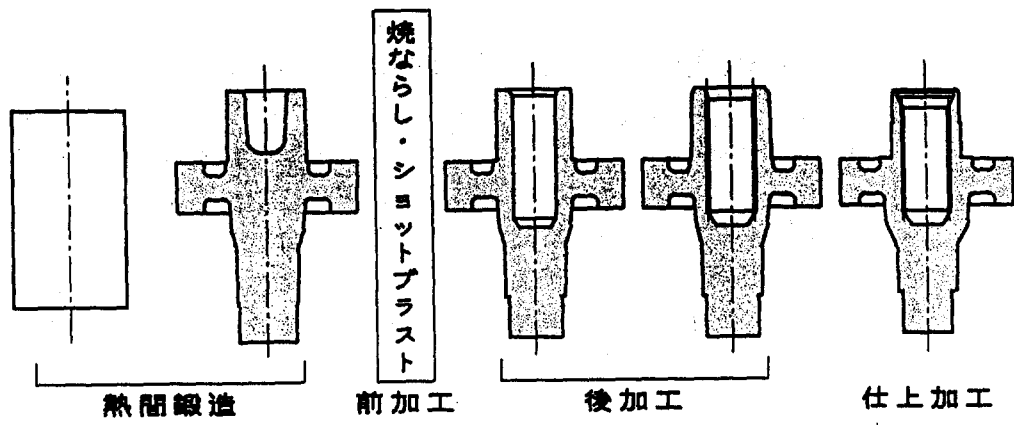
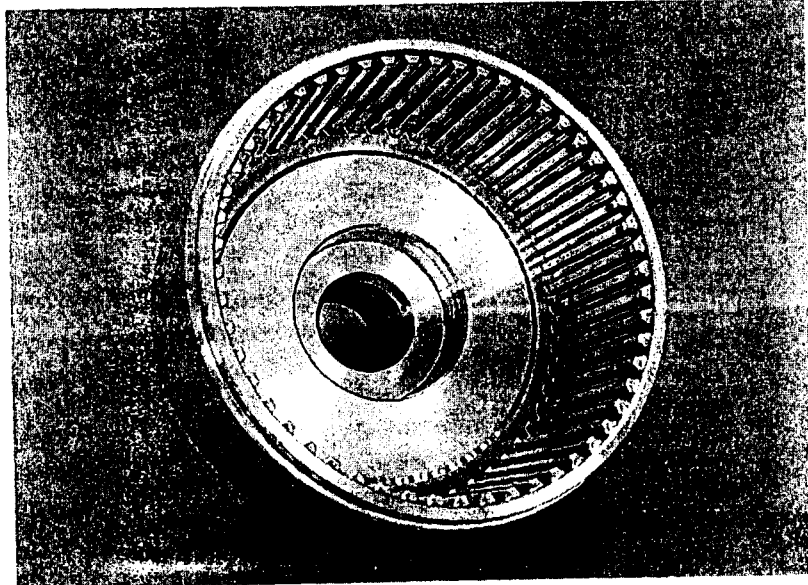


写真9 キー付き外ヘリカルギヤ

FIG.4



写-4-a 中間加工に機械加工を断加した精密鍛造品



写-4-b 回転成形品

FIG.5

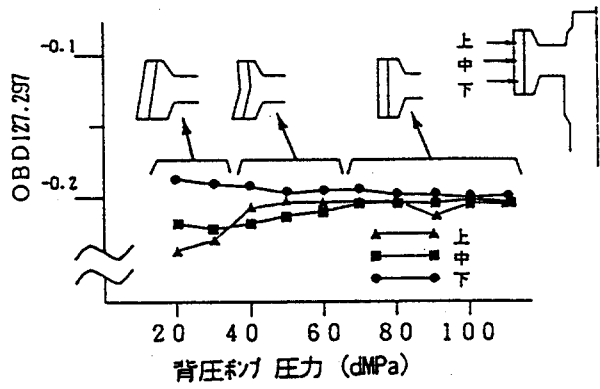


図19-1 歯形精度と成形条件

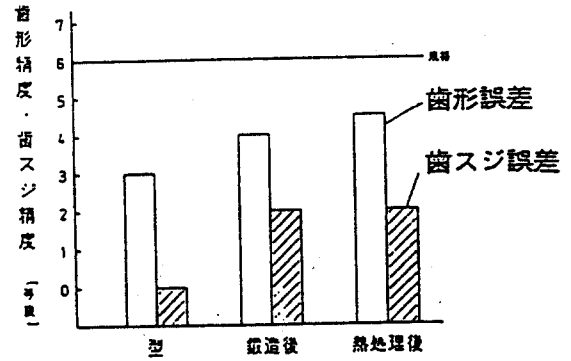


図19-2 型精度と製品精度

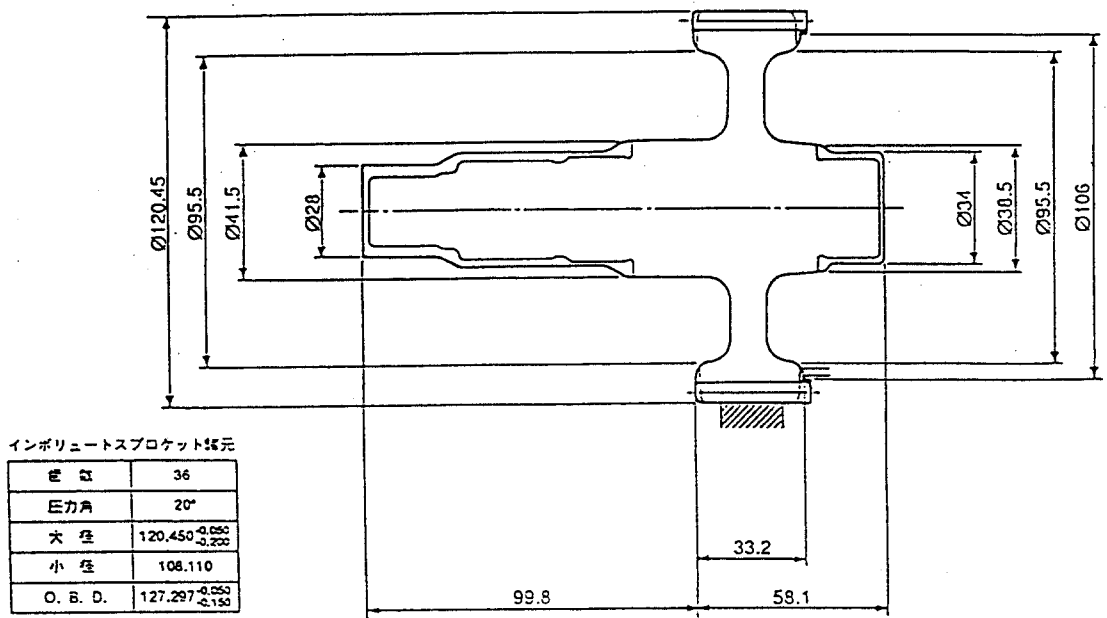


図19 スプロケット部品

FIG.6

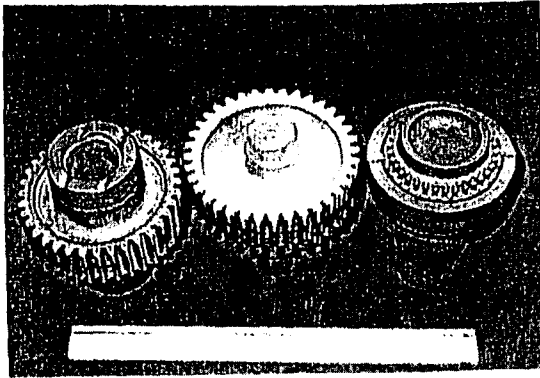


写真1 94年実用化部品

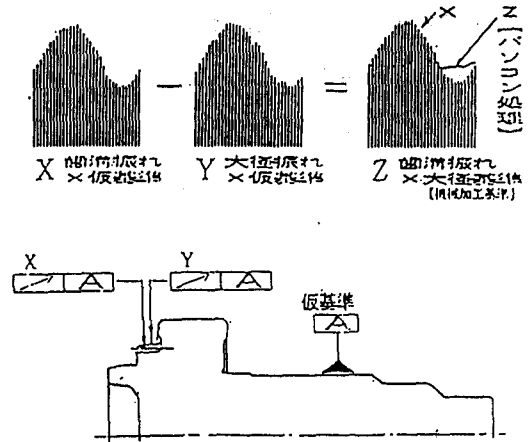


図21 パソコン処理付き歯形測定

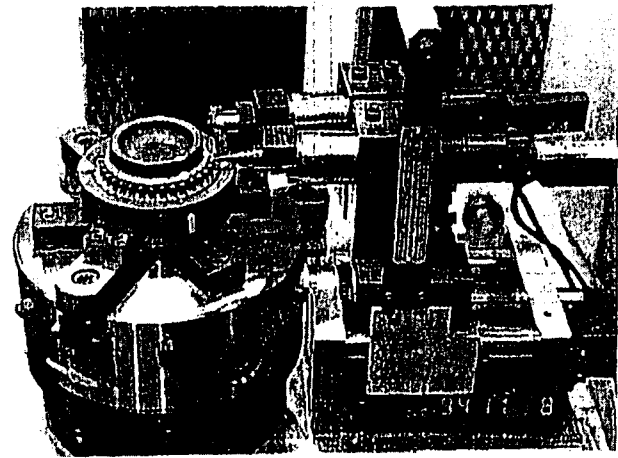


写真3 仮基準計測部

FIG.7

インボリュートスプライン規格

歯数	66
圧力角	20°
大径	146.000 ^{+0.350} ₀
小径	141.900 ^{+0.150} ₀
S. B. D.	138.639 ^{+0.160} ₀

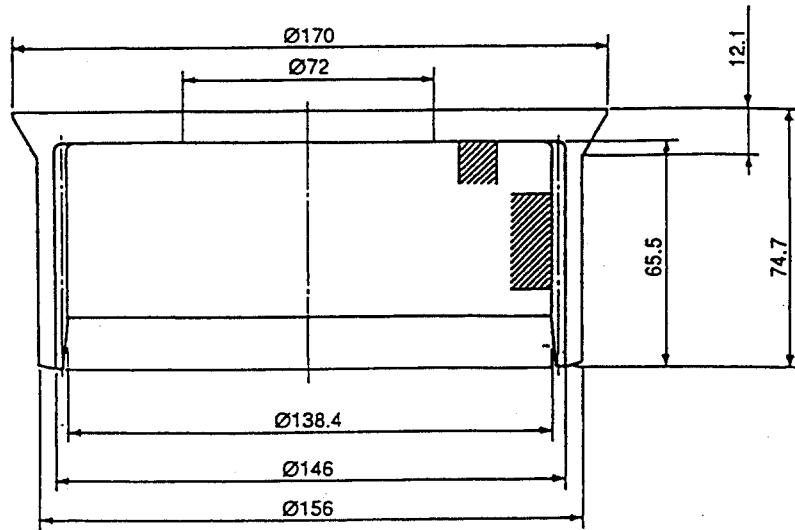


図20 インターナルスプライン部品

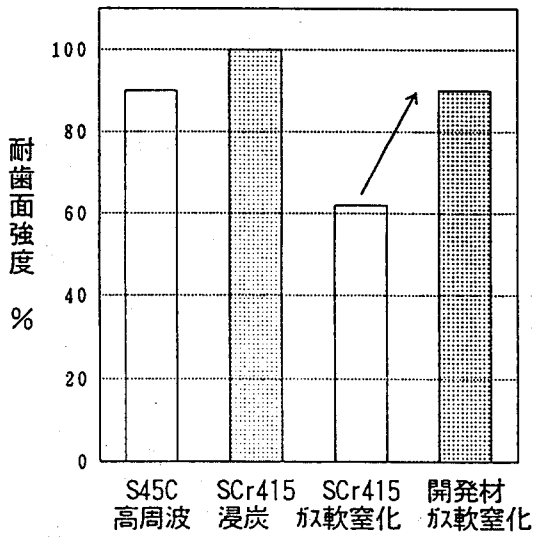


図20-1 材質×熱処理と歯面強度

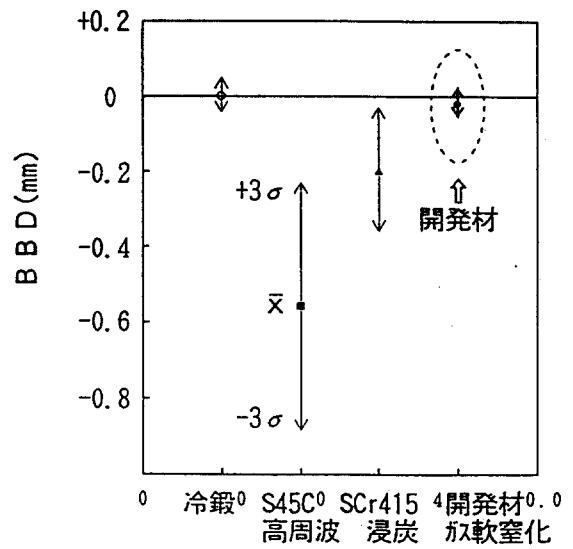


図20-2 材質×熱処理と寸法精度

FIG.8