SAMMI

한국소성가공학회 단조분과위원회
제10회 단조 심포지움

증기터빈 회전익 열간단조품 개발

삼미금속 주식회사

발표자 : 변우순, 김종규

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회사 연혁

- 설립 1969.07 — 삼미금속㈜ 설립
- 창원공장 가동 1979.07 — 창원공장 설립
- 기술제휴 1982 & 1988 — 日本 동경단공소(TDF) (2차례 6년간)
- ISO 9002(1996.11) QS 9000(1999.12) ISO/TS 16949(2004.12) — 열간단조부문 ISO 9002 , QS 9000인증획득 국내최초 열간단조부문 ISO/TS 16949 인증획득
- M & A 2004.02 — 삼호그룹으로 인수

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회사 개요

인원

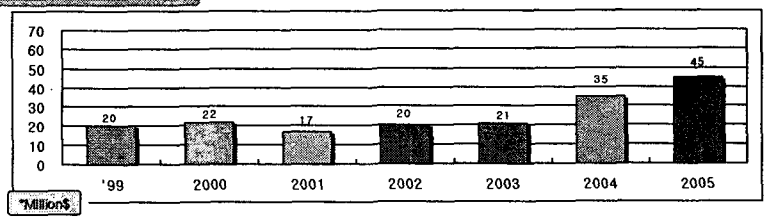
총인원 - 136명
생산직 - 100명
사무직 - 36명

工場面積

坐地 89,100㎡ (27,000坪)
建坪 29,400㎡ (8,900 坪)

KAC - 001

연간 매출액



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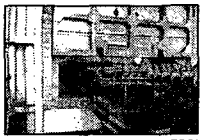
보유 설비

단조 설비

1 - 40 ton Counter Blow Hammer Line (설치중)
1 - 35 ton Counter Blow Hammer Line
1 - 6 ton Air Drop Hammer Line
2 - 6.5"~3.0" Upsetter Line
5 – 1300~3000 ton Forging Press Lines

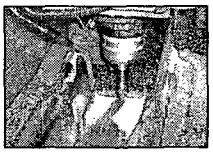
열후처리 설비

5 – Heat-Treat Furnaces
7 - Hydraulic & Coinning Press (80 ~ 630 ton)
5 - Shot Blaster



금형제작 설비

7 - CNC Copy Milling M/C & CAM SYSTEM
1 - Electric Discharge M/C
2 - CNC Graphite Electrode M/C 등.



기타 검사설비등 보유

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주 생산품

자동차 부품

-. I-Beam (Front Axle)
-. Crank Shaft
-. Rear Axle Shaft
-. Steering Knuckle
-. Connecting Rod & Others

중장비 및 농기계 부품

-. Track Link
-. Crank Shaft
-. Connecting Rod
-. Cam Shaft

선박엔진용 부품

-. Connecting Rod
-. Cam Shaft
-. Others

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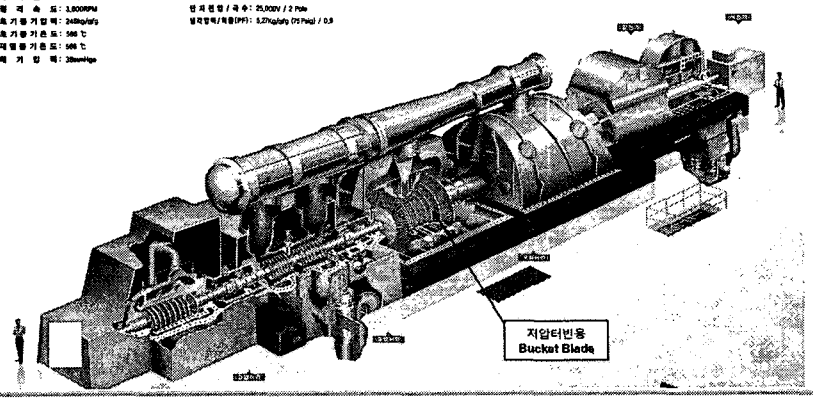
터빈발전기용 Bucket Blade 개발

터빈발전기용 Bucket Blade



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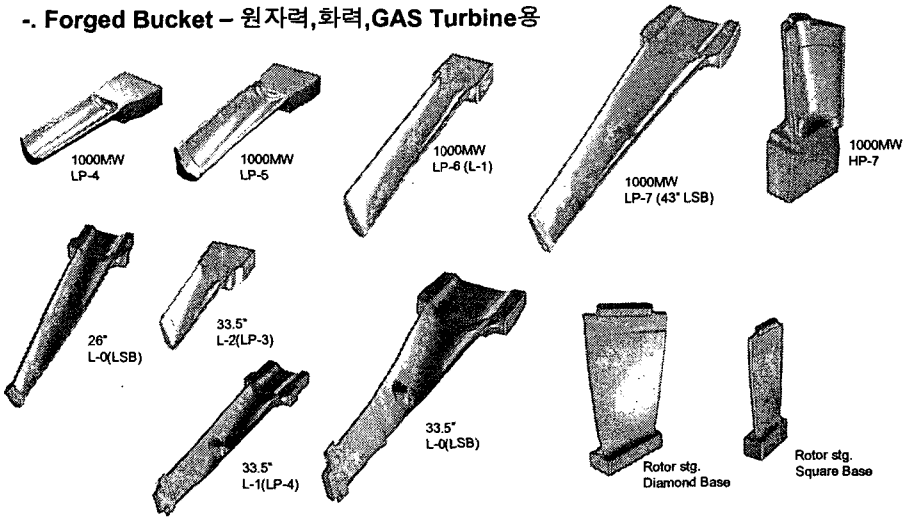
터빈발전기용 Bucket Blade 개발

-. Forged Bucket – 원자력,화력,GAS Turbine용



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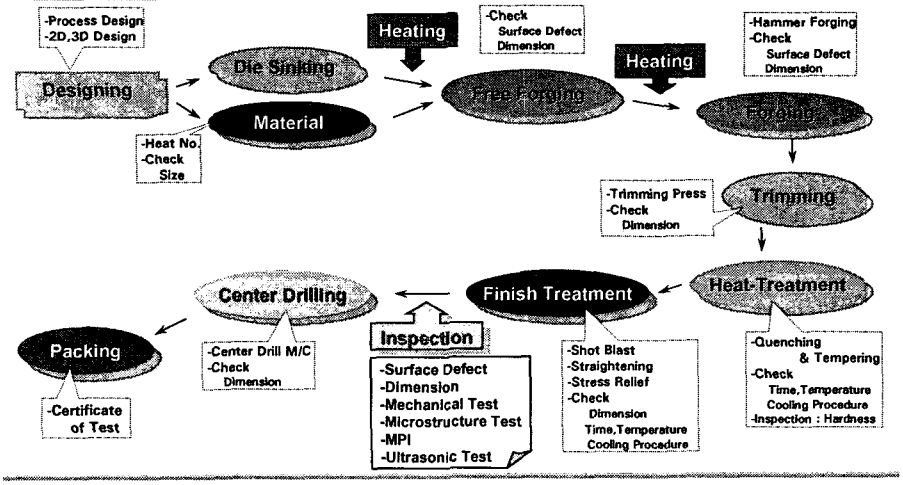
터빈발전기용 Bucket Blade 개발

제작 공정



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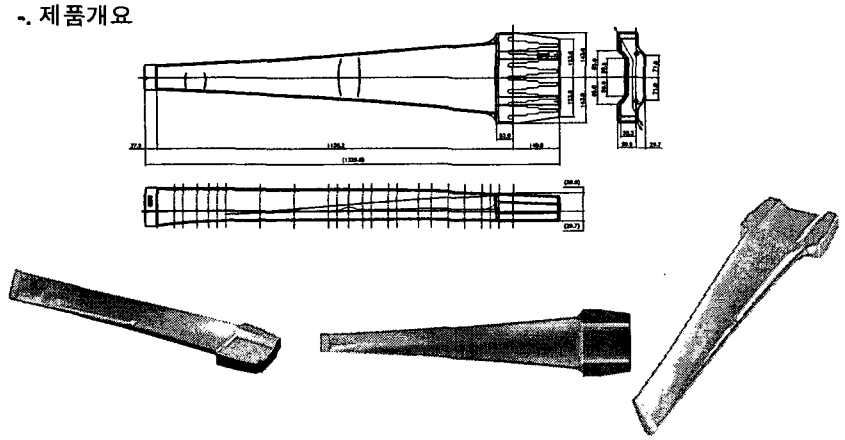
터빈발전기용 Bucket Blade 개발

상세 제작 공정 - 원자력용 LSB(LP-7) Forged Bucket

-. 제품개요



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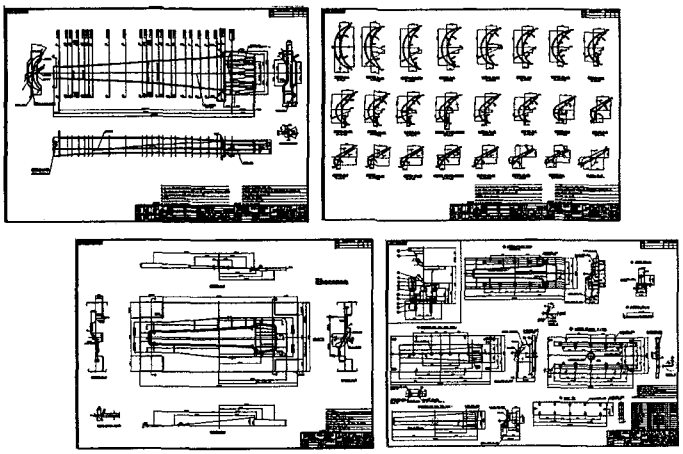
터빈발전기용 Bucket Blade 개발

-. 제품 및 금형설계



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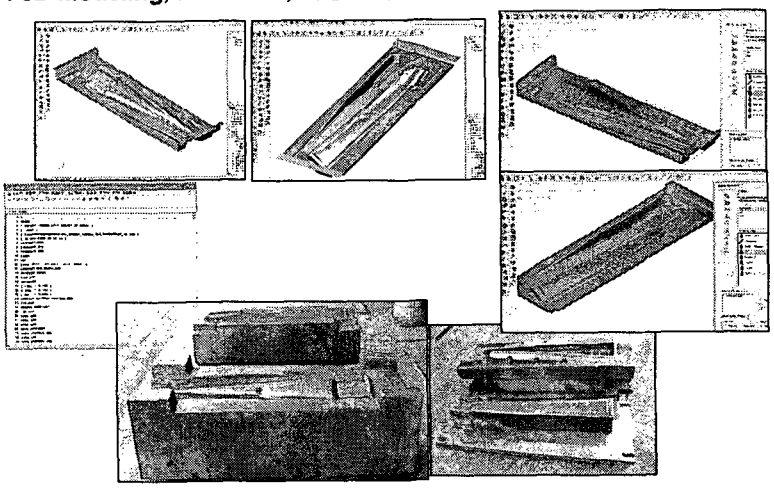
터빈발전기용 Bucket Blade 개발

-. 3D Modeling, NC-DATA, 금형제작



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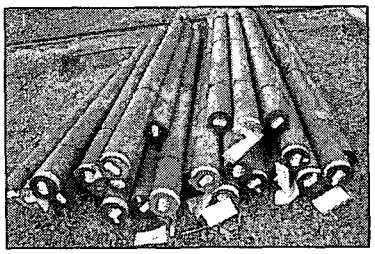
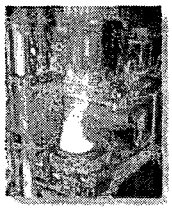
터빈발전기용 Bucket Blade 개발

-. 원소재

B50A947B2
GE Material 403/410 & 403 Cb Stainless Steel
Basic Electric Furnace, Remelt quality(ESR),
Fully heat treated for properties
Chemical Composition :
- Carbon 0.12-0.15
- Chromium 11.50-12.50
- Nickel max.0.75
- Copper max 0.50
- Columbium 0.05-0.20
-
-

After Q.T
-Tensile Strength : 110 ksi min.
-Yield Strength : 80 ksi min.
-V-Notch Charpy : 25J min.
-Brinell Hardness : 223-285
-Less than 1% delta ferrite
-Average grain size ASTM 5 or finer





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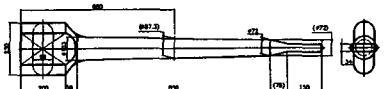
터빈발전기용 Bucket Blade 개발

-. 원소재절단 & Pre-forming

Cutting with band-saw



Pre-forming : 2ton Free forging Hammer

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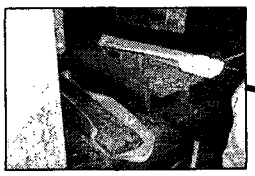
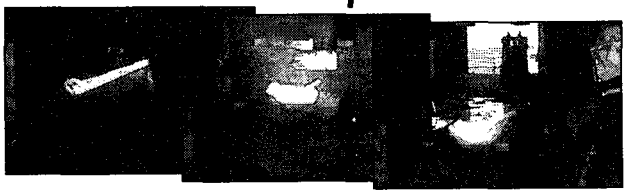
터빈발전기용 Bucket Blade 개발

-. 형단조 및 트리밍

2ton 가열로 1170C max.



1200ton Trimming Press



35ton C.B.Hammer – 1140C~1000C

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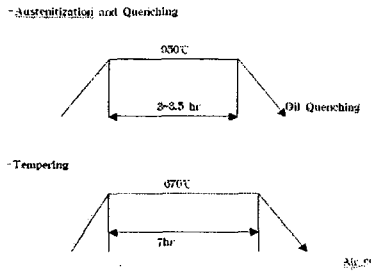
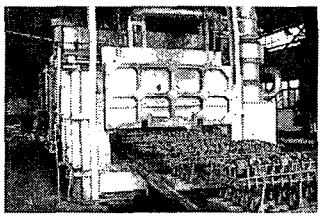
터빈발전기용 Bucket Blade 개발

-. 열처리 및 경도검사



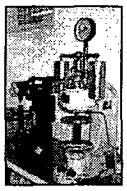


Test Method : Brinell Hardness Tester

경도 Spec. : HB 223-269

Frequency : All forgings 2 point

(Dovetail & Tip)



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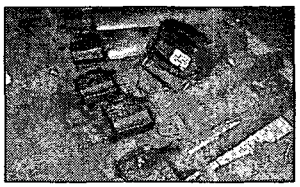
터빈발전기용 Bucket Blade 개발

-. Non-Destructive Testing

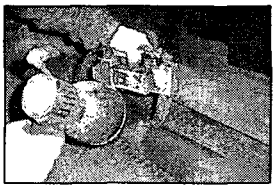
Ultrasonic Test

SETTING SENSIVITY METHOD				COUPLANT
PROBE	METHOD	STANDARD	SCANNING	
MB4S-E	BACK REFLECTION	B1 100%	STD.SEN + 6dB	SAE 35 OIL



Magnetic Particle Test

DENSITY	ILLUMINATION	INTENSITY	LIFTING POWER	COLOR/TYPE
0.2ml/100 ml	max.20 Lux	Min.1000μW/cm²	Min.18.1kg	MMG-P



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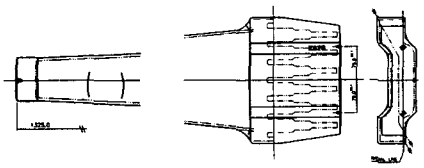
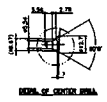
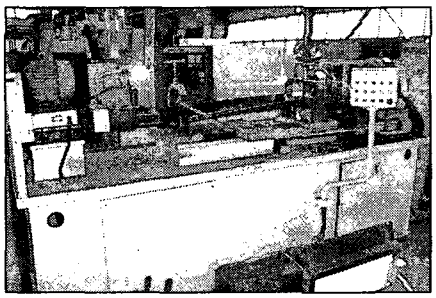
터빈발전기용 Bucket Blade 개발

-. Center Drilling





Dovetail & Tip 2곳



Center Drilling용 전용 설비

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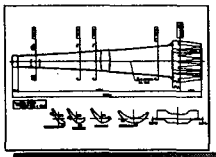
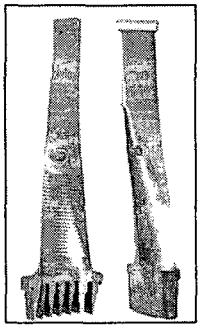
터빈발전기용 Bucket Blade 개발

-. Dimension Check



전제품 CENTER가공후 각부위
치수측정-가공여유 보장

치수 검사용 전용 치구



전면가공 완제품