313086

LABORATORY REPORT
GETRAG S.p.A. - B/WLQ 2

GETRAG

REPORT 14/127

Date: 03/07/2014
Author: Raffaele Padolecchia

Reason for analysis:	PPAP + Full Layout dimensional

Requester:	WLQ5 - Auditor Bari

Part Name:	SG6
P/N:	250.1.3646.37
State of parts:	Finished

Material:	GCG_805000_Part 2
Customer:	Ford

Result:	OK

Distribution List:	WLQ5 - Auditor Bari WLQ1 - G. Montenegro GPS1 - G. Russo GPS1 - R. Malerba

Notes:	Production lot 14737843 - rack #09/12 Furnace #4 - charge 29991 Material batch: C

Surface Hardness Verification

Sample	Scale	Position	Values [mm]	Range	Component
-	HRC	M1	60,0	-	Gear
-	HRA	M1	82,1	80,5 + 2.5	Gear
2104/14	HV 5	M2	753	680 + 130	Engagement ring

Core Hardness Verification

Sample	Scale	Position	Values [HV10]	Range	Component
2099/14	HV10	M4	393	≥ 300	Gear

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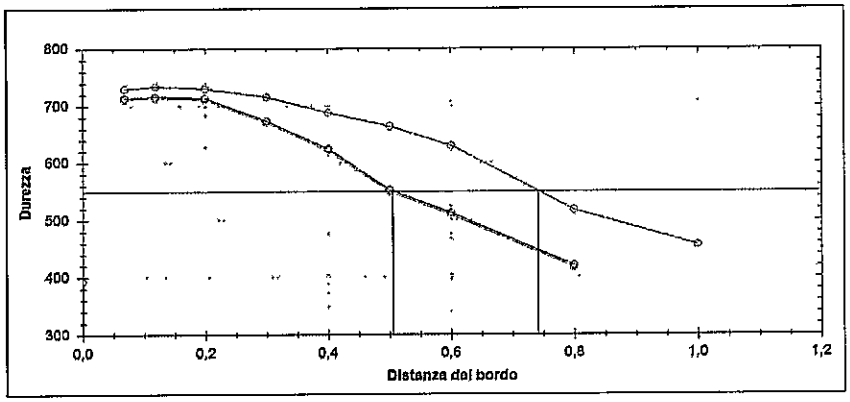
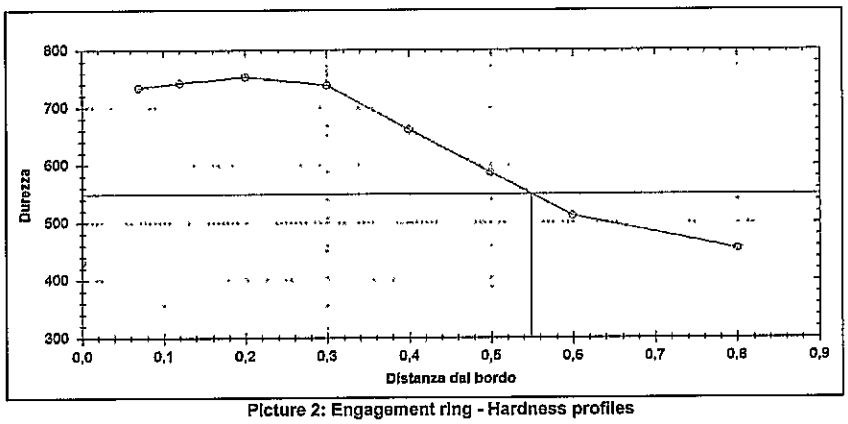
CHD Verification

Sample		Position	Values [mm]	Range	Component
2099/14	CHD 550 HV1	M2	0,74	0.5 + 0.4 mm	Gear
2099/14	CHD 550 HV1	M3	0,51	min. 0.3 mm	Gear
2099/14	CHD 550 HV1	M1	0,55	0.4 + 0.4 mm	Engagement ring



Picture 1: gear - Hardness profiles



Picture 2: Engagement ring - Hardness profiles

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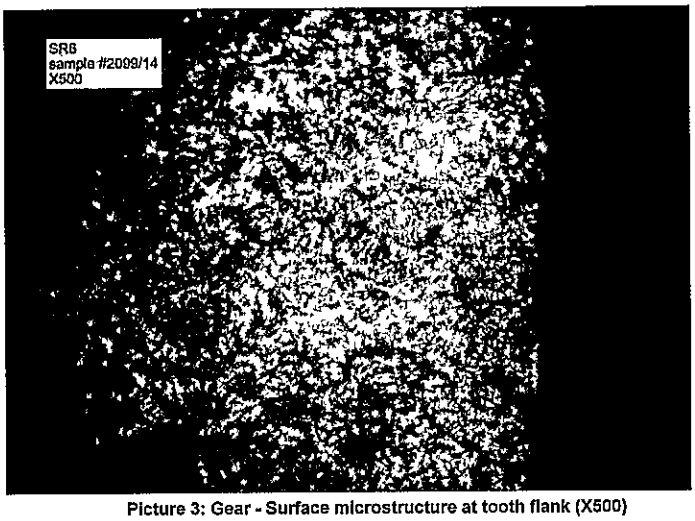
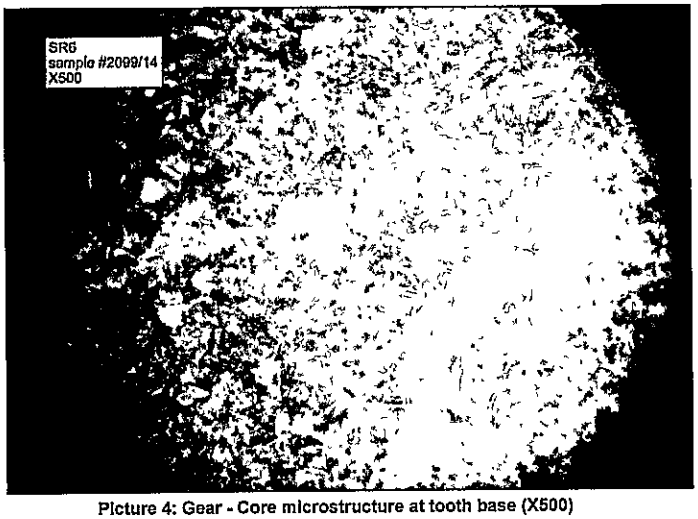
Metallographic Analysis

Sample #	2099/14
Gear - Tooth flank surface structure:	Martensite + 5% retained austenite (OK)
Gear - Tooth base core structure:	Martensite + bainite (OK)



Picture 3: Gear - Surface microstructure at tooth flank (X500)



Picture 4: Gear - Core microstructure at tooth base (X500)

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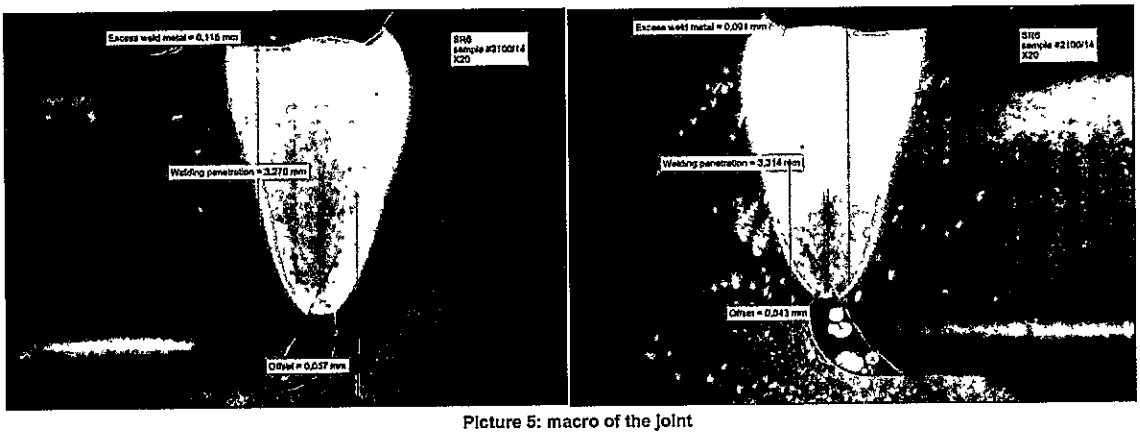
Weld Seam Analysis

	Position	Welding penetration [mm]	offset [mm]	Excess weld metal [mm]
Sample # 2100/14	0°	3,3	0,06	0,12
Sample # 2100/14	180°	3,3	0,04	0,09
Range		min 2,8	max ± 0.1 mm	max 0.5 mm



Picture 5: macro of the joint