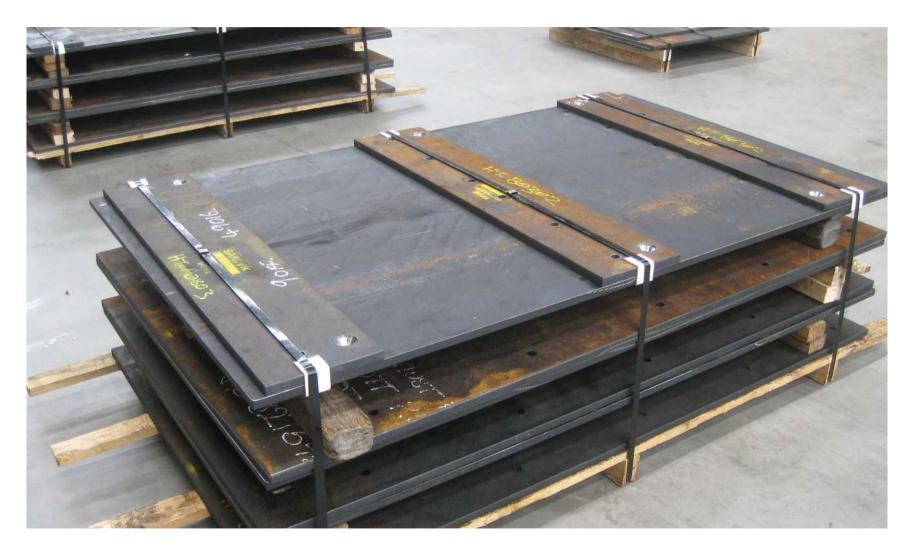
ENDURA Dual - The New Standard for Fixed Plant Liners used in Ore Processing

TITUS • STEEL •

Paul Kobelke, Sandvik Materials Technology,



ENDURA Dual fixed Plant Liners Presentation TOPICS



- 1 The GRIZZLE Intro impact abrasion the perfect start for ENDURA Dual
- 2 Pilbara Iron Scalping Screen 2010 Case Study
- 3 The Unique combination of properties behind ENDURA Dual success .
- 4 ENDURA Dual the perfect choice for most fixed plant application .
- 5 Weld overlay replacement a focus market
- 6 Processing ENDURA Dual The Key to ongoing success .
- 7 Summary Selecting the right target to start is important

First Stage Processing of ROM Ore typically requires both Impact and Slide Abrasion resistance .





The Grizzle Deck is used to separate lump ore from the fines prior to the primary crusher circuit – Demanding Service Application







ENDURA Dual 40 & 50 mm Grizzle Decks

Replacing ENDURA as the previous Iron Ore Grizzle Deck standard over the Past Decade



2003 -Traditional approach utilised 500 HB Water Quenched Wear Plate delivering average 3 months service

2013 Service Update





ENDURA Dual Delivers min 50%

Extended Service Life over ENDURA

ENDURA – Grizzle Finger after 3 months service – June 2003



2006 Service Update

ENDURA Grizzle Deck Fingers are now used extensively throughout the Pilbara, delivering significant service life improvement across the iron ore industry.
100% plus service life improvement



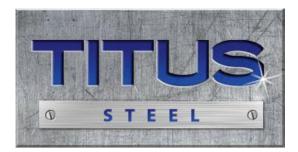


Rio Tinto - Pilbara Iron – Tom Price High Grade Iron Ore Stock Pile



- **SERVICE** Primary Screen Decks handling high grade hematite ore
- Wear Mechanism medium Impact / high slide abrasion
- Large tonnage through put 20 MT / annum –
- Ore feed subject to variation in Lump / Fines ration

PI -Tom Price ENDURA 30 mm thick – High Grade Scalping Screen Deck after 12 weeks Service .





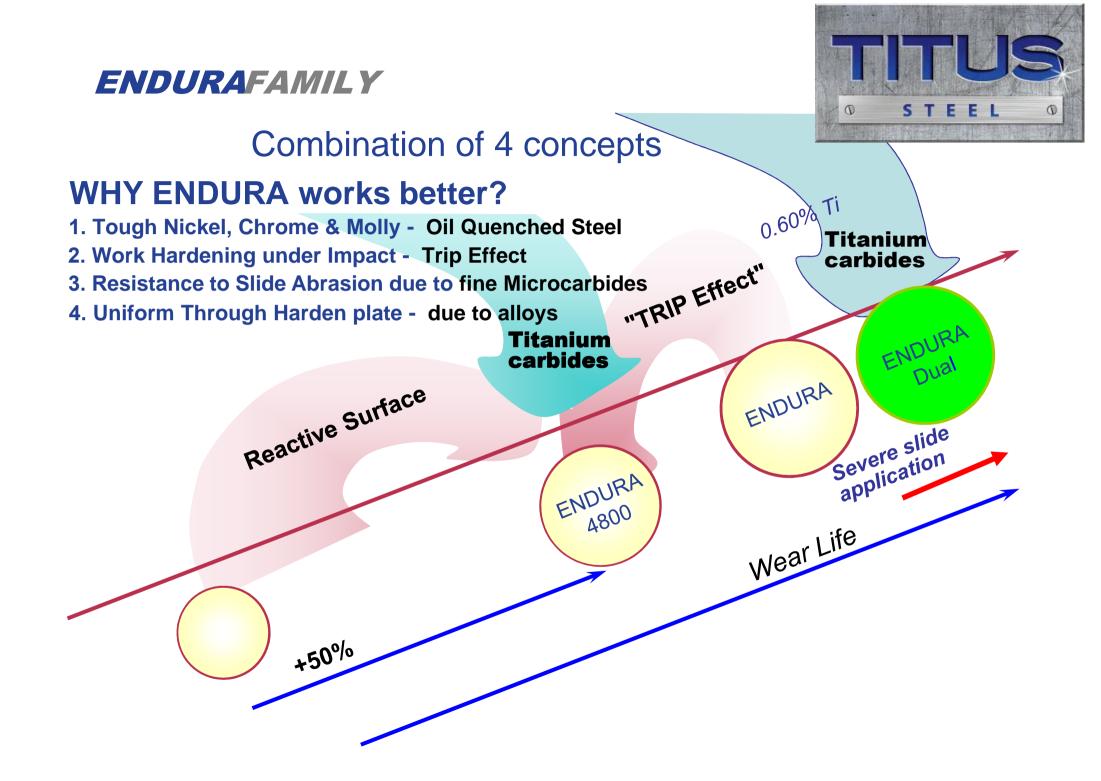
PI -Tom Price ENDURA Dual 30 mm thick – Grade Scalping Screen Deck after 18 weeks Service – 50 % Increase Service Life







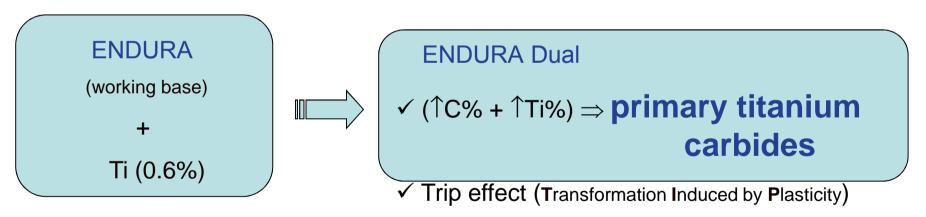
ENDURA Dual LINERS **INCREASE** SERVICE LIFE BY min 50% over ENDURA And Typically 100% Plus Over Std Q & Wear Plate





WHY IS ENDURA Dual UNIQUE

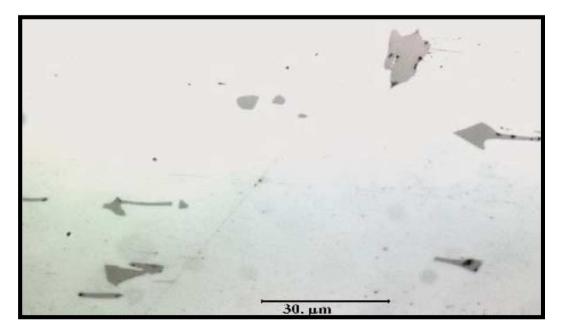
The answer is given by a sophisticated grade, which is built around the metallurgy of ENDURA combined to a high titanium content

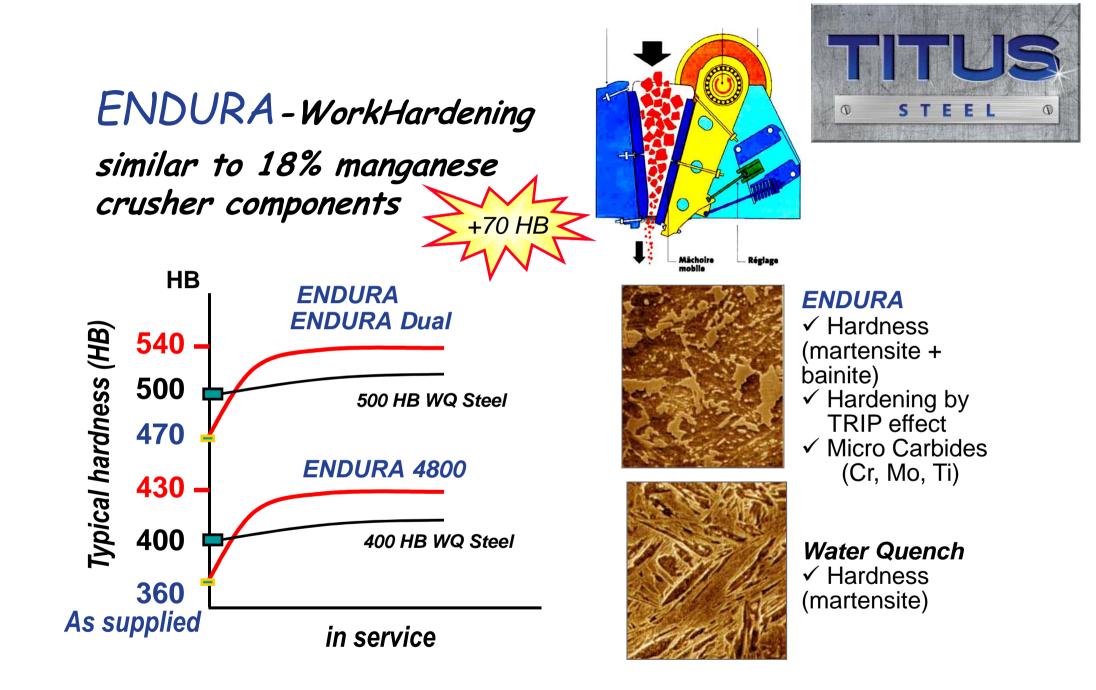




ENDURA Dual

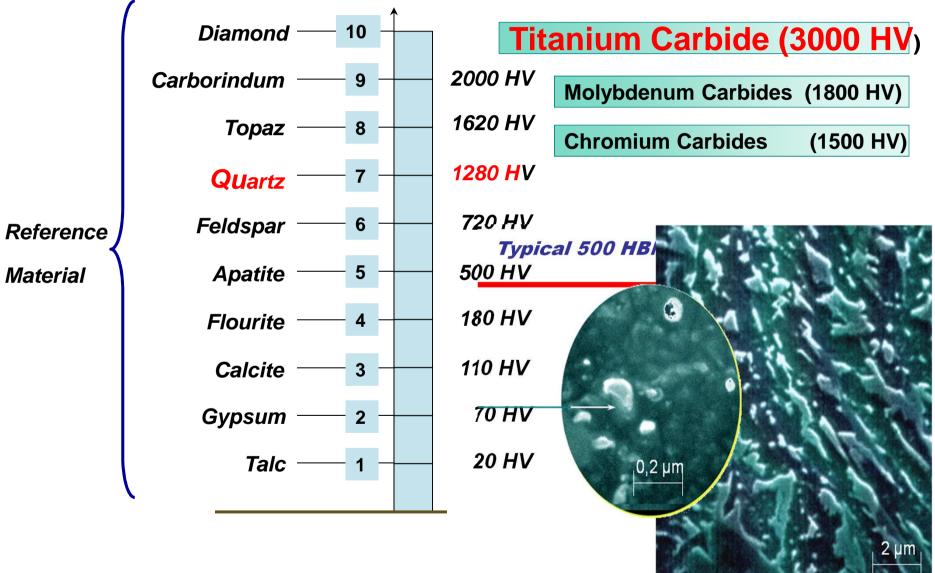
- C Mn Ni Cr Mo S Ti
- ≈ 0.40 ≈1.30 ≈ 0.45 ≈ 0.70 ≤ 0.340 ≤0.002 ≈ 0.60
- Maintains all the properties of ENDURA
- Delivers significantly improved slide abrasion resistance over ENDURA
- Target market replacing WELD OVERLAY- high abrasion +impact load





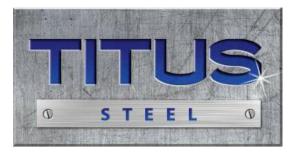


Typical Mines Rock Ore Hardness Mohs hardness ENDURA Micro Carbides



(**) dependent on thickness

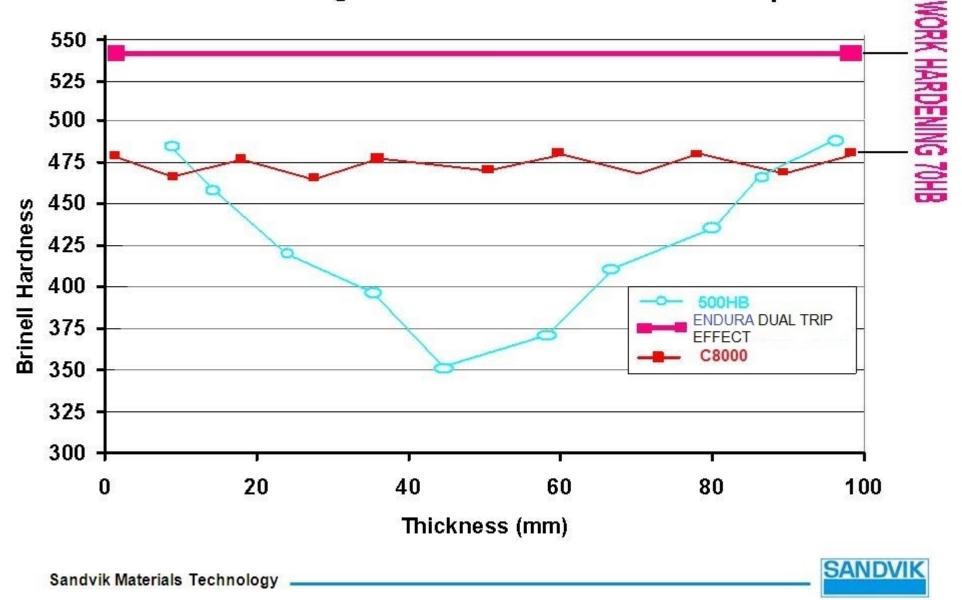
ENDURA Dual and the Carbide ROAD - Concept





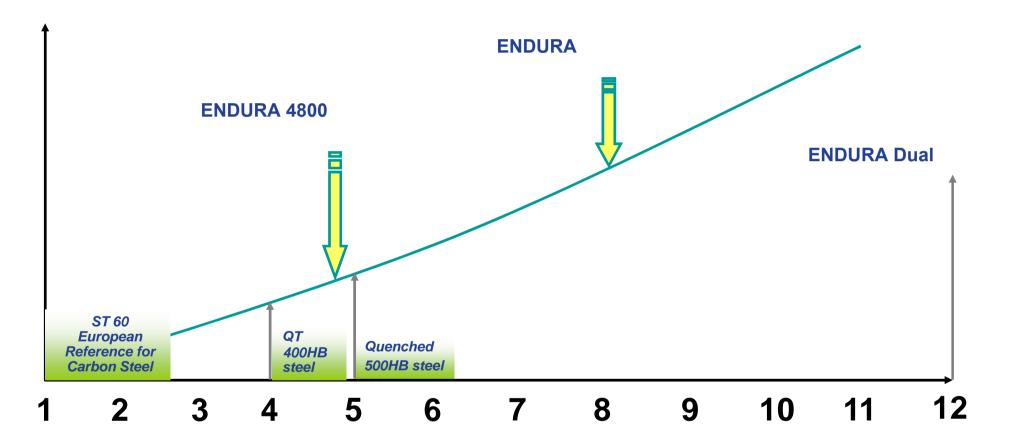
ENDURA Dual Hardness Consistency

Hardness through the thickness - 100mm thick plate



Comparison of service life





ENDURA - Iron Ore Mine - Pilbara

Replacing 500HB wear plate min 100% Service Life

Improvement









Coal -25 mm Roller Feeder Screen. ENDURA Dual FLOWERS Double the Service Life Replacing 500HB Material with hard faced teeth

ENDURA WEAR SERVICE Update – 2013 CADIA Valley MINE - FIXED PLANT Application





Cadia High Grade Stock Pile Bath Liners supplied in ENDURA Replaced Ni Hard – 2008 Replaced in 2012 after 4 years in service . ENDURA Dual 50 mm upgrade liner material Proposed for this application at Cadia Mine .



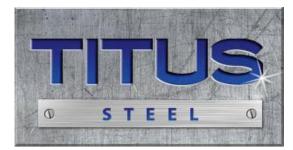




ENDURA Dual Lined Coal chutes –Replacing 450 HB Q & T wear plate Weld overlay has edge wear issues

ENDURA Diverging Feeder Liner Sets - PI-STD ENDURA Dual replacement increase service life by 50% Replacing Weld Overlay extending service life 30%

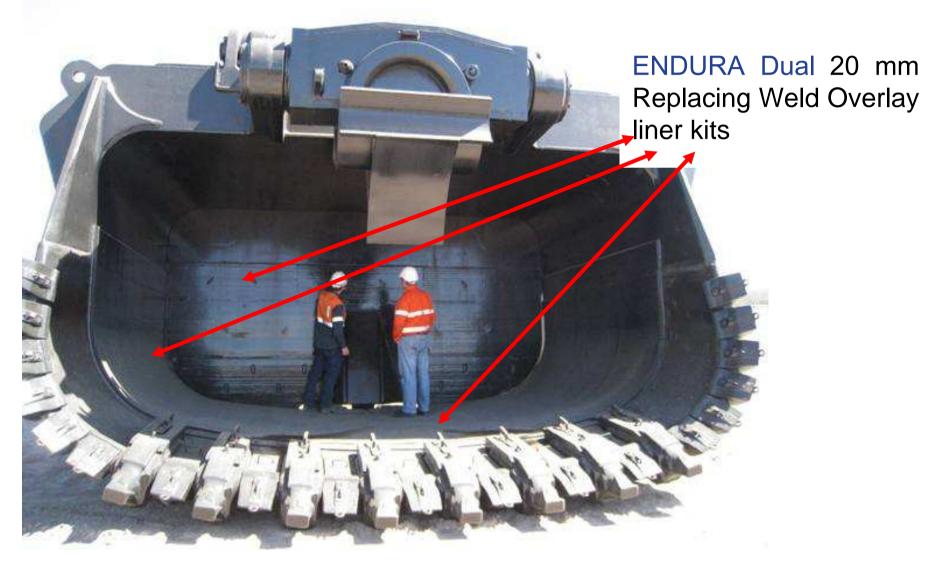








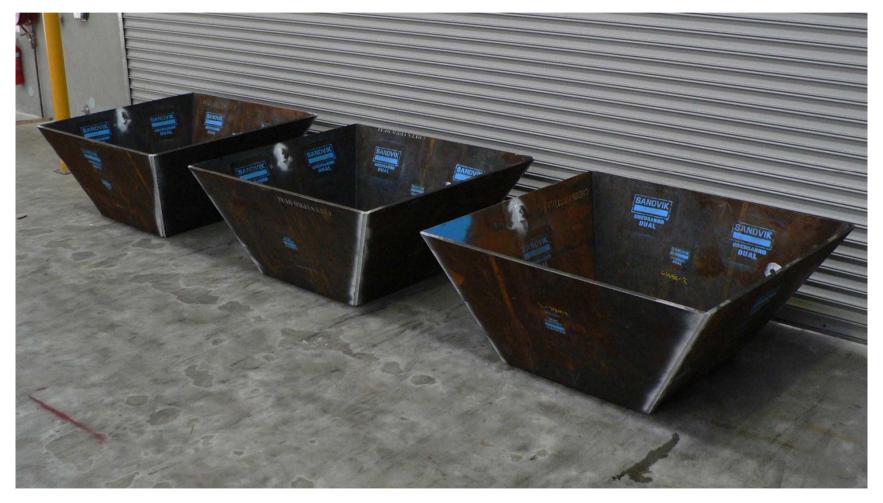




ENDURA Dual 20 mm - Train Load Out Vault Liners

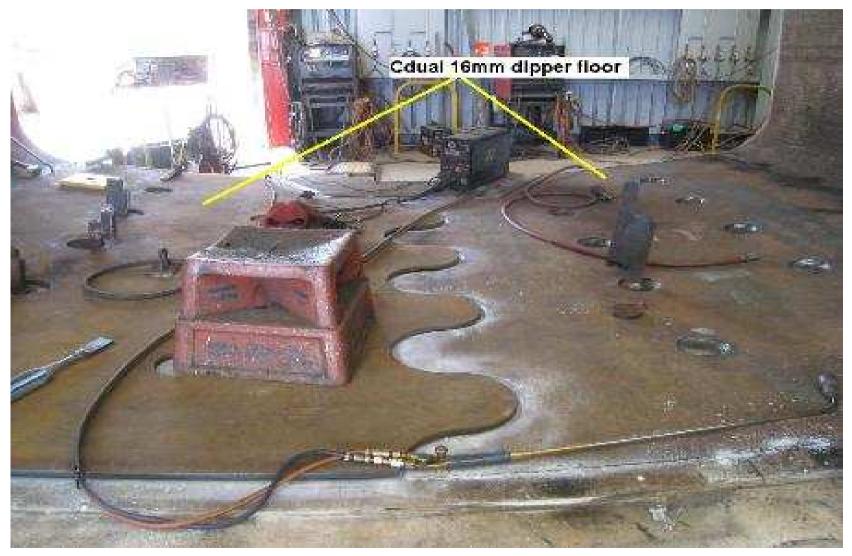
- Iron Ore Mine
- Pilbara replacing weld overlay
- Fabrication includes safety approved lifting lugs







ENDURA Dual WELDING – Good Practice Critical





ENDURA DUAL WELD PROCEDURE SPECIFICATION -[WPS]

Essential this is reviewed and followed at all times

WELD PROCEDURE SPECIFICATION (WPS)

• 1> Flux Cored Wire FCAW

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WELD	ING CODE		AS. 1554	4		CLIENT										
WELDING PROCESS			FCAW.			PROJECT			TYPICAL CreusabroCDUAL FCW wire Welding Procedure							
EDGE	PREPARATION		PLASMA CUT AND GROUND			DRAWING NO.			N/A							
JOINT			8-9 mm	WPO NO.					Sandvik Creusabro(1)							
	FOSITION		2F Down			WPQ NO.				Sandvik Creusabro(1) Sandvik Creusabro(1)						
· · · · ·	JOINT TOLE	PANCE			ATERIAL		1			ONSUM			c .			
Rootga		N/A	12	Grade / type -		Creusabro CDual	Bra	nd Name -		CIND CINE	(DLL D					
Root Fa		N/A		Material Group		NA		Electrode Class - 1			E 71 T					
	d Angle (A)	N/A				690Mpa and 400 HI		Brand Name - 2			2/11					
	oint Angle	90*			Material Group N/A		Electrode Class			-						
Prequalified Joint		N/A		Carbon Eqv.			Electrode Condit									
Prequalified Consumables						N/A	Shield			•	20-25 %CO2 - Bal Augon					
	Gap Tolerance	N/A		Range Oual.		50 mm	1						-			
6	590Mp a / 400H	B backir	ıg p Å te	Typical 10	Omm Ø		3	×	Ers	sure moi	isture	freeb] efa	re welding		
			PARATION						RMAL	TREATM						
			te or Plass	na	-		HEAT -	1. C.	_			PWHT.	- 'C			
	ut seq'd				_	Preheat method	10	Oxy / Ace	t	FWHT - 1			N/A	5 		
		N/A					Preheat Temp. 150° C		_	Soak Temp.			N/A	٥		
Interpa		Wire bru	sh			Preheat Retention	-	N/A	_	Duration			N/A	8		
Back Gouge		N/A				Man. Temp. Start		20 Deg C		Heating Rate			N/A N/A			
								N/A								
Gouge	Mth 1	N/A	_			Preheat Check	_			Cooling F				6		
Gouge Finish 1	Mth I req'd	N/A As Welde				Max Interpass		280 Deg		Withdraw		p. 1	N/A			
Gouge Finish 1 I	Mth 1 req'd . PASS DETAILS	As Welde	CONSU	IMABLE DESC		Max Interpass SHIELD GAS	165	280 Deg	PARAI	Withdraw METERS	ral Tem	np. 1	N/A HEA	T INPUT		
Gouge Finish z I NO.	Mth 1 req'd , PASS DETAILS SIDE PO	As Welde		SIZEØnm	S PECI Exxx	Max Interpass SHIELD GAS F. FLOW X Umin	AMP	280 Deg ELDING : 5 V	PAR AI	Withdraw METERS S PER month	ral Terry ED min	p. 1 1 POL - /+ A	N/A HEA	KJ/mm MA		
Gouge Finish 1 I	Mth 1 req'd . PASS DETAILS	As Welde	CONSU		SPECE	Max Interpass SHIELD GAS F. FLOW X Umin	165	280 Deg ELDING : 5 V	PARAI	Withdraw METERS SPEE	ral Terry ED min	p. 1 1 Pot.	N/A HEA	KJ/mm MA		
Gouge Finish 2 I NO.	Mth 1 req'd , PASS DETAILS SIDE PO	As Welde	CONSU	SIZEØnm	S PECI Exxx	Max Interpass SHIELD GAS F. FLOW X. Umin T. 17-18	AMP	280 Deg ELDING : 5 V	PAR AI	Withdraw METERS S PER month	ral Terry ED min	p. 1 1 POL - /+ A	N/A HEA	KJ/mm MA		
Gouge Finish z I NO.	Mth 1 PASS DETAILS SIDE P(1 2	As Welch 15. F	CONSU	SIZEØnm	S PROCE EXCOR E. 71	Max Interpass Max Interpass SHIELD GAS R FLOW Innin T 17-18 Lit/min	AMP	280 Deg ELDING : 5 V	PAR AI	Withdraw METERS Sper month 250 -	ED nin 290	p. 1 P0L -/+A DC+I	N/A HEA	KJ/mm MA		
Gouge Finish 1 NO. 1	Mth 1 req'd , PASS DETAILS SIDE PO	As Welch 15. F	CONSU	SZEØnm 1.2 mm	S PROCE EXCOR E. 71	Max Interpass Max Interpass SHIELD GAS R. FLOW X. Unnin T 17-18 Lit/min HNIQUE	AMP	280 Deg ELDING 3 3 V 70 27	PARAI	Withdraw METERS Sper month 250 -	ED nin 290	p. 1 P0L -/+A DC+I	N/A HEA	KJ/mm MA		
Gouge Finish r I NO. 1	Mth 1 PASS DETAILS SIDE P 1 2 WELDER D	As Welch 15. F	CONSU	SEE0mm 1.2 mm Push/Dag	SPECI EXXX E 71 TEC	Max Interpass SHELD GAS R FLOW X Unian T 17-18 Lit/min HNIQUE Flush& Pull	AMP	280 Deg 280 Deg 381 DING 3 5 V 70 27 70 27	PARAI OLIS 28 Size	Withdraw METERS Sper month 250 -	ED nin 290 AWDE	p. 1 P0L -/+A DC+I	N/A HEA	KJ/mm MA		
Gouge Finish 1 I N 0. 1 N 0. 1 N 0.	Mth 1 PASS DETAILS SIDE P 1 2 WELDER D	As Welch 15. F	CONSU	SZEØnm 1.2 mm	SPECI EXXX E 71 TEC	Max Interpass Max Interpass SHIELD GAS R. FLOW X. Unnin T 17-18 Lit/min HNIQUE	AMP	280 Deg FELDING : 5 V 70 27 Nozele : Tungste	PARAI OLTS 28 Sime m Sime	Withdraw METERS SPEE manth 250 - GT	ED min 290 AW DE N/A N/A	p. 1 P0L -/+A DC+I	N/A HEA	KJ/mm MA		
Gouge Finish z I NO. 1 No. 1 No. 1 No. 2 No. No. 2 No. No. No. No. No. No. No. No. No. No.	Mah 1 PASS DETAILS SIDE P 1 2 WELDER D ther	As Welch 15. F	CONSU	SEE0mm 1.2 mm Push/Dag	SPECI EXXX E 71 TEC	Max Interpase SHELD GAS R FLOW Vinin T 17-18 Lat/mm HNIQUE Push& Pall Gldvalar	Амр 250 - 2	280 Deg 280 Deg 381 DING 3 5 V 70 27 70 27	PARAI OLTS 28 Sime m Sime	Withdraw METERS SPEE manth 250 - GT	ED nin 290 AWDE	p. 1 P0L -/+A DC+I	N/A HEA	KJ/mm MA		
Gouge Finish z I NO. 1 No. 1 No. 1 No. 2 No. No. 2 No. No. No. No. No. No. No. No. No. No.	Mah 1 PASS DETAILS SIDE P 1 2 WELDER D wWELDER D	As Welds	CONSI TYPE BRAND	SEE 8mm 1.2 mm Puth / Dag Transfer Type	SPECI EXXX E. 71 TEC	Max Interpass SHELD GAS R FLOW X Unian T 17-18 Lit/min HNIQUE Flush& Pull	Амр 250 - 2	280 Deg FELDING : 5 V 70 27 Nozele : Tungste	PARAI OLTS 28 Sime m Sime	Withdraw METERS SPE manda 250 - GT	ED min 290 A.W.DE N/A N/A N/A	p 1 PoL -/+ A DC+ I	N/A HEA	KJ/mm MA		
Gouge Finish r I NO. 1 Name ID Nar Dated Stringe:	Mith 1 PASS DETAILS SIDE P 1 2 WELDER D WELDER D	As Welds	CONSI TYPE BRAND ER AND	SEE 8mm 1.2 mm Push / Dag Transfer Type WELDING PR	SPECI EXXXX E. 71 TEC RACTICE	Max Interpase SHIELD GAS R FLOW T 17-18 Lathmin T 17-18 Lathmin HNIQUE Rush& Pall Globalas	AMR 250 - 2	280 Deg ELDING 3 5 V 70 27 Nozele 3 Tungste Tungste	PARAI OLTS 28 Size m Size m Size	Withdraw METERS SPEE muth 250 - GT GT	ED min 290 AW DE N/A N/A N/A	P. 1 POL -/* A DC+I	N/A HEA	KJ/mm MA		
Gouge Finish 2 NO. 1 Name ID Nar Dated Stringer R acius	Mith I Preed I PASS DETAILS SIDE PASS DETAILS SIDE P 1 2 WELLDER D weekLDER D weekLDER D s/Weave: RECC s all plate edges	As Welde S. F. ETAILS DMMEND and rem	CONSI TYPE BRAND ER AND ED GOOD over rust s	SZE önen 1.2 mm Push / Drag Transfer Type WELDING PF cale and contar	SPECI EXXX E. 71 TEC RACTICE minants p	Max Interpase SHIELD GAS F. PLOW Uman T. 17-18 Lithmin T. 17-18 Lithmin HNIQUE Rush& Pull Globular STICKOUT: 22 me rior to welding	AMP 250 - 2	280 Deg ELDING 3 5 V 70 27 Nozele 3 Tungste Tungste	PARAI OLTS 28 Size m Size m Size	Withdraw METERS SPE manda 250 - GT	AW DE N/A N/A N/A N/A	P. 1 POL/+ A DC+I TAILS	N/A HEA	T INPUT KJ/mmMAJ 1.65 Kj/m		
Gouge Finish n N 0. 1 Name ID Narre ID Narre ID Narre Racius Ensur	Min 1 Min 1 PAGS DETAILS SIDE R 1 2 WELDER D wWELDER D nber r/Weave: RECC s all plate edges e plates are dyn	As Welde 35. F ETAILS DMMEND and rem and apply	CONSU TYPE BRAND PED GOOD ove rust s y a soakin	SZE önen 1.2 mm Push / Drag Transfer Type WELDING PF cale and cortain g pre heat .NC	EXXX E. 71 TEC RACTICE minants p	Max Interpace SHELD GAS R. FLOW Umin T 17-18 Lithmin HNIQUE Rush& Pull Globular STICKOUT: 22 mm	AMP 250 - 2 n D Macro	280 Deg ELDING : 5 V 70 27 Nozzle : Tung ste T	PARAI OLTS 28 Size m Size m Size	Withdraw METERS SPEE muth 250 - GT GT	ED min 290 A W DE N/A N/A N/A V/A V/A	P. 1 POL/+ A DC+I TAILS	N/A HEA	KJ/mm MA		
Gouge Finish n N 0. 1 Name ID Nar Dated Stringer Radius Ensur U Se B	Mén 1 Mén 1 PASS DETAILS SIDE P 1 2 WELDER D WELDER D WELDER D RECC e all plate edges er dy ack Sieg weldin	As Welds S. F. ETAILS DMMEND and rem and apply g at max	CONSU TYPE BRAND PED GOOD ove rust s y a soakin 150 mm	SEE Ørm 1.2 mm Park / Drag Transfer Type cale and cortaa g pre heat. NG clus do not we	EXXX E. 71 TEC RACTICE minants p D MOISTI Id around	Mask fatorpass SHIELD GAS P. DOW Drain T 17-18 Lat/min HNIQUE Pauho Pall Globalar STICKOUT: 22 me rior to welding JRE is critical sharp corners	AMP 250 - 2 n D Macro Hardnes	280 Deg ELDING : 5 V 70 27 Nozzle : Tungste Tungste T	PARAI OLTS 28 Size m Size m Size	Withdraw METERS SPEE muth 250 - GT GT	al Tem ED 290 N/A N/A N/A N/A N/A DPI	P. 1 POL/+ A DC+I TAILS	N/A HEA	KJ/mm MA		
Gouge Finish n I No. 1 Name Dated Stringes Radius Ensur Use B Ensur	Min Min , , , , , , , , , , , , , , , , , , ,	As Weld S. F. ETAILS DMMEND and apply g at max up and a	CONSU TYPE BRAND BED GOOD over rust s y a soakin 150 mm j pply appro	SZE Ønm 1.2 mm Puh/Dng Tander Type WELDING PF cale and cortated g pre heat. NC glus do not we prist at tacks to	SPECI EXXX E 71 TEC RACTICE mainants p D MOISTI Id around o reduce w	A dark faborgan GAS SHELD SHELD SHELD SAS Vision Note HNIQUE Pushok Pull Globalar STICKOUT: 22 me rior to welding URE is orticed sharp corners eld joint streas	AMP 250 - 2 250 - 2 2 50 - 2 2 2 50 - 2 2 2 50 - 2 2 2 50 - 2 2 2 50 - 2 2 50 - 2 2 50 - 2 50 - 2 50 50 - 2 50 - 2 50 - 2 50 - 2 50 	280 Deg ELDING : 5 V 70 27 Nozzle : Tungste Tungste T	PARAI OLTS 28 Size m Size m Size	Withdraw METERS SPEE muth 250 - GT GT	Al Tem ED 290 290 N/A N/A N/A N/A N/A DPI MPI	P. 1 POL/+ A DC+I TAILS	N/A HEA	KJ/mm MA		
Gouge Finish r I No. 1 Name Dated Stringes Radius Ensur Use B Ensur Develo	Min II Min II SIDE PI II VELDER D WELDER D WELDER D WELDER D SIDE PI WELDER D SIDE PI SIDE	As Welde S. F ETAILS DMMEND and apply g al max up and a nce plan	CONSU TYPE BRAND ED GOOD ove rust s y a soakin 150 mm j pply appra	SZE®mm 1.2 mm Puh / Dag Transfer Type outer and cortage g pre heat.NG pus do not we've printe tacks to	SPECI EXXX E. 71 TEC ACTICE minants p D MOISTI Id around preduce w stress lev	A face fatorpage SHELD GAS PLOW X Drain T T 17-18 Lit/min T T 17-18 Lit/min HINQUE Ruhde Full Globular STICKOUT: 22 me STICKOUT: 22 me STICK	AMP 250 - 2 250 - 2 250 - 2 2 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	280 Deg ELDING : 5 V 70 27 Nozzle : Tungste Tungste T	PARAI OLTS 28 Size m Size m Size	Withdraw METERS SPEE muth 250 - GT GT	Al Tem ED min 290 290 290 290 290 290 290 290 290 290	P. 1 POL/+ A DC+I TAILS	N/A HEA	KJ/mm MA		
Gouge Finish n NO. 1 Name ID Nara ID Nara ID Nara ID Nara Radius Ensur Use B Ensur Use B Ensur Devela	Min	As Welds S. F ETAILS DMMEND and apply g at max up and a noce plan. DT permi	CONSU TYPE BRAND ED GOOL over rust s y a soakin 150 mm pply approt to control the d, the r	SZEŚmm 1.2 mm Puh/Dng Thansfer Type WELDING PF Outele and contain g pre heal. No olus do not we's pri ate tacks to weld restraint of run is official	SPECI EXXX E. 71 TEC ACTICE minants p D MOISTI Id around oreduce w. stress lev cal avoid	Mark Euterpace SHELD SHELD SHELD SHELD T 17.18 Lthman Lthman HNUQUE Pethods Pall STICKOUT: 22 res STICKOUT: 22 res SHELD control STICKOUT: 22 res STICKOUT: 22 res res vidi goint stress vidi goint stress	AMP 250 - 2 250 - 2 2 50 - 2 2 2 50 - 2 2 2 50 - 2 2 2 50 - 2 2 2 50 - 2 2 50 - 2 2 50 - 2 50 - 2 50 50 - 2 50 - 2 50 - 2 50 - 2 50 	280 Deg ELDING : 5 V 70 27 Nozzle : Tungste Tungste T	PARAI OLTS 28 Size m Size m Size	Withdraw METERS SPEE muth 250 - GT GT	Al Tem ED 290 290 N/A N/A N/A N/A N/A DPI MPI	P. 1 POL/+ A DC+I TAILS	N/A HEA	KJ/mm MA		
Gouge Finish n NO. 1 Name ID Nara ID Nara ID Nara ID Nara Radius Ensur Use B Ensur Use B Ensur Devela	Min II Min II SIDE PI II VELDER D WELDER D WELDER D WELDER D SIDE PI WELDER D SIDE PI SIDE	As Welds S. F ETAILS DMMEND and apply g at max up and a noce plan. DT permi	CONSU TYPE BRAND ED GOOL over rust s y a soakin 150 mm pply approt to control the d, the r	SZEŚmm 1.2 mm Puh/Dng Thansfer Type WELDING PF Outele and contain g pre heal. No olus do not we's pri ate tacks to weld restraint of run is official	SPECI EXXX E. 71 TEC ACTICE minants p D MOISTI Id around oreduce w. stress lev cal avoid	Mark Euterpace SHELD SHELD SHELD SHELD T 17.18 Lthman Lthman HNUQUE Pethods Pall STICKOUT: 22 res STICKOUT: 22 res SHELD control STICKOUT: 22 res STICKOUT: 22 res res vidi goint stress vidi goint stress	AMP 250 - 2 250 - 2 250 - 2 2 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	280 Deg ELDING : 5 V 70 27 Nozzle : Tungste Tungste T	PARAI OLTS 28 Size m Size m Size	Withdraw METERS SPEE muth 250 - GT GT	Al Tem ED min 290 290 290 290 290 290 290 290 290 290	P. 1 POL/+ A DC+I TAILS	N/A HEA	KJ/mm MA		
Gouge Finish 1 No. 1 Name I Data Data Strings- Radiuu Ensur Use B Ensur Devel Poor q Do No WFS - :	Min	As Welds S. F ETAILS DMMEND and apply g at max up and a noce plan. DT permi	CONSU TYPE BRAND ED GOOL over rust s y a soakin 150 mm pply approt to control the d, the r	SZEŚmm 1.2 mm Puh/Dng Thansfer Type WELDING PF Outele and contain g pre heal. No olus do not we's pri ate tacks to weld restraint of run is official	SPECT EXXX E. 71 TEC TEC MACTICE minants p O MOISTI Id around preduce w stress lev cal avoid et as starw Y	Mark Interpret SHELD SHELD SHELD SAS P PLOW Puma T 17.18 LUbmin LUbmin Phild Public Publ	AMP 250 - 2 250 - 2 250 - 2 2 5 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	280 Deg ELDING : 5 V 70 27 Nozzle : Tungste Tungste T	PARAI OLTS 28 Size m Size m Size	Withdraw METERS SPEE muth 250 - GT GT	Al Tem ED min 290 290 290 290 290 290 290 290 290 290	P. 1 POL/+ A DC+I TAILS	N/A HEA	KJ/mm MA		

2> Solid Wire GMAW

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WELD PROCEDURE SPECIFICATION (WPS)

WELDING CODE		AS. 1554.4			CLI	ENT									
			G.MA.W			PROJECT				TYPICAL Creusabro CDUAL Solid Wire MIG PROCEDURE					
EDGE PREPARATION	ł	PLASMA	LASMA CUT AND GROUND			DRAWING NO.			N/.	N/A					
JOINT TYPE	8-9 mm	mm FILLET			WPQ NO.			Sandvik Creusabro(1)							
JOINT POSITION	2F Down	nhand			WPS No.			Sandvik Creusabro(1) Sandvik Creusabro(1)							
JOINT TO	ERANCE	1		MATERIAL	110000000		1			CONSUM			IS		
Root gap (G)	N	4	Grade / type			abro Dual	Bre	nd Nam		100110		oum			
Root Face (F)	N	90.	Material Gro		NA	a010 D.uai		ctrode C		-	EP 7	105.4			
Included Angle (A)	NU.		Grade / type - 2			6901Mina or 400HB		Brand Name - 2			ER 705-4				
Fillet Joint Angle	90				NA			rand Name - 2 lectrode Class - 2							
Prequalified Joint	90 N(Carbon Eqv.		N/A		Electrode Class - 2 Electrode Conditioni			ing Clean					
Prequalified Consumables N/					N/A			elding g					0 -25 % CO2 - Bal Argon		
Max Gap Tolerance	N/		Range Qual.	٢	50 mm	8	014	carmin 2	w		40-4	5 700	04 1	a mon	
TYPICAL Slotsize 50mm 100mm long 690 Mpa / 400 H Ø	(B b ackin	g plate	TYPICAL	 100mm		Ľ	\mathcal{F}_{3}	2			¢)		-8mm fillet	
MATE	DIAL DDD	PARATION			-	100		T		sur e moi		free b	efor	e welding!!	
Cutting Method					-	PD	EHEAT -		TERGVEN	, IREALIN	IEI VI	PWH	r 97*		
Class cut req'd	0xyFlat	ne or Plass	na		n '			Oxvil		DUATE .	72	1 WH	N/A		
						Preheat method					PWHT - Type		N/A		
Chemical Clean N/A						Preheat Temp Preheat Retention		150°		Soak Temp Duration Time		N/A N/A			
	Wire bru	sh			Preh	eat Retentio	m	N/A			Time		NUA		
					-		1025					-	****		
Back Gouge	N/A					Temp. Sta	1025	20 De	gC	Heating H	Rate		N/A		
Back Gouge Gouge Milh	N/A N/A	\leq			Prel	heat Check	1025	N/A	Ĭ	Heating H Cooling H	Rate Rate		N/A		
Back Gouge Gouge Mih Finish req'd	N/A N/A As Weld	ed			Prel Max	heat Check v Interpass	nt	N/A 280 D	eg C	Heating H Cooling H Withdraw	Rate Rate	np	N/A N/A		
Back Gouge Gouge Milh	N/A N/A As Weld	ed	IMABLE DESC	CRIPTION	Prel Max	heat Check	nt	N/A 280 D	eg C	Heating H Cooling H	Rate Rate	np	N/A N/A	T INPUT	
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RECOMMENDED GOOD WELDING PRACTICE



ENDURA Dual -Requires Good Control for a Successfully Welded Joint

1> Radius all plate edges, remove scale and contamination prior to welding.

2> Ensure a close joint fit up and apply appropriate tacks to reduce weld stress .

3 > Develop a weld sequence plan to control weld restraint stress levels .

4> Ensure plates are dry and apply a soaking **150 Deg C pre heat** - NO Moisture

5> Use Back Step welding at max **150 mm** plus do not weld around sharp corners

6> Poor quality welding is NOT Permitted, the root run is critical avoid weld defects

7> DO NOT fill plug with weld metal . Use a 6-8 mm fillet as standard on most joints.

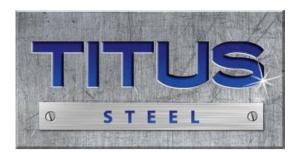


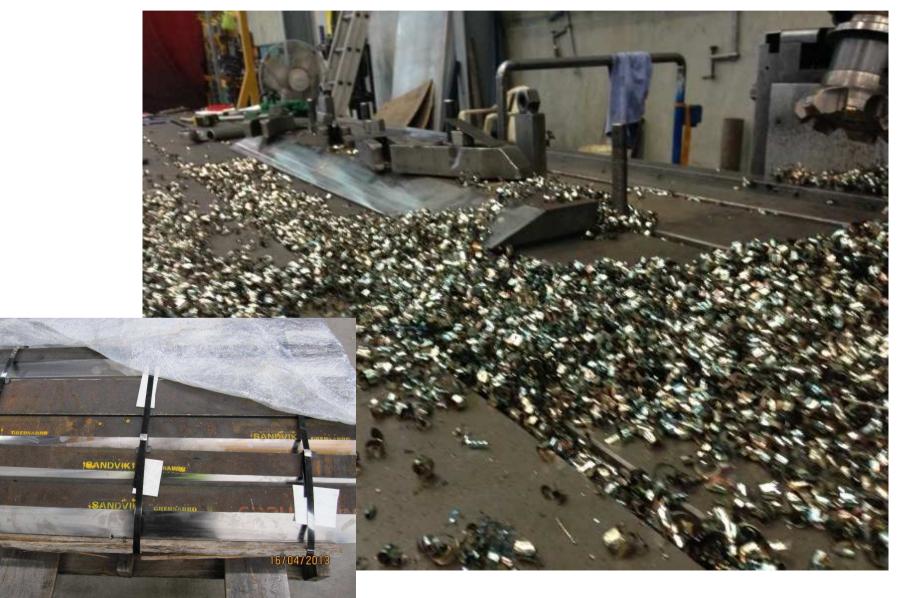
ENDURA Dual Stud Welding – Well Proven No Problems – provided control procedures maintained



ABCement - ENDURA Dual 50 mm Push Blades

Machined using heavy cuts on large milling machine . ENDURA Dual machine requires similar settings to ENDURA – improved chip breaking





ENDURA 30 mm plate drilled and tapped Offers significant advantages in fixed plant applications ENDURA Dual has similar M/c characteristics







ENDURA Dual Forming the REAL Challenge with this grade



ENDURA Dual 20 mm Pressing Failure – Handle with care – notch



- ENDURA DUAL is far more notch sensitive than ENDURA due to the primary Titanium carbides – Min 150 deg C preheat required and use large former and dye openings - NO tight radius.
- Roll forming when possible preferred .
- Form with care as only the best will be successful in pressing ENDURA DUAL







ENDURA Dual 20 mm Formed Bucket Liner Kit





Worlds BIGGEST Loader Bucket liner formed in ENDURA Dual 20 mm 1700 x 6600 mtrs . Supply to Cape Preston - 2009 Replacing Weld Overlay Summary -Selecting the right target to start is important



- ENDURA Dual is a UNIQUE Steel perfect for all high impact abrasion application
- ENDURA Dual delivered min 50 % extra service over ENDURA and over twice the life of all other wear plates .
- A key ENDURA Dual target market is replacement of weld overlay where it not only last longer but provides significant cost savings .
- ENDURA Dual requires close welding control and forming needs to be undertaken by the best in the game not for everyone.
- ENDURA Dual should be used as the standard Creusabro liner material across all fixed plants – stand out performer which will promote itself once in service .

ENDURA Dual - The FUTURE for all TITUS STEEL Fixed Plant Application





 The NEW Standard Approved and Ready To GO ENDURA Dual 16 & 20 mm Liners ready for November 2013 Pilbara mine Fixed Plant Shut down.