

# CAPITAL INVESTMENT COSTS FOR PLANT AND EQUIPMENT IN IRON AND STEELMAKING

## Research Report

CONTENTS		Page
CONTENTS .....		1
LIST OF EXHIBITS .....		3
DISCLAIMER .....		7
EXECUTIVE SUMMARY .....		8
<b>1. INTRODUCTION .....</b>		<b>9</b>
1.1 Background .....		9
1.2 Definitions .....		9
1.3 Scope of report .....		10
1.4 Abbreviations .....		11
1.5 Sources of information .....		12
<b>2. INVESTMENTS .....</b>		<b>13</b>
2.1 Steel plants .....		13
2.1.1 BOF / cast slab .....		13
2.1.2 Integrated steel plant.....		14
2.1.3 EAF / cast billet .....		15
2.1.4 Scrap based steelworks .....		16
2.2 Upstream investments .....		17
2.2.1 Sinter plant .....		17
2.2.2 Coke batteries .....		18
2.2.3 Direct reduced iron plant .....		19
2.2.4 Blast furnace .....		20
2.2.5 Basic oxygen furnace .....		21
2.2.6 Electric arc furnace .....		22
2.2.7 Induction furnace .....		23
2.2.8 Slab casting .....		24
2.2.9 Billet and bloom casting .....		25
2.3 Downstream investments .....		26
2.3.1 Steel plate .....		26
2.3.2 Hot rolled coil .....		28
2.3.3 Cold rolled coil .....		29
2.3.4 Hot dip galvanising .....		30
2.3.5 Tin plate .....		31
2.3.6 Organic coating .....		32
2.3.7 Heavy sections and rail .....		33
2.3.8 Steel bar .....		35
2.3.9 Wire rod .....		37
2.3.10 Drawn wire .....		38
2.3.11 Welded tube .....		39
2.3.12 Seamless tube .....		40

CONTENTS		Page
2.4	Ancillary investments .....	41
2.4.1	Pellet plant .....	41
2.4.2	Coal washing plant .....	43
2.4.3	Lime plant .....	43
2.4.4	Pulverised coal injection .....	44
2.4.5	Hot metal desulphurisation .....	45
2.4.6	Blast furnace reline .....	46
2.4.7	Ladle furnace .....	46
2.4.8	Vacuum degassing .....	47
2.4.9	Air separation unit .....	48
2.4.10	Power plant .....	49
2.4.11	Temper / skin-pass rolling .....	50
2.4.12	Slitting line .....	51
2.4.13	Pickling line .....	52
2.4.14	Waste water treatment plant .....	53
2.4.15	Acid regeneration plant .....	53
3.	SOME INVESTMENT CHOICES .....	55
3.1	Steelmaking: BOF versus EAF and the induction furnace .....	55
3.2	Hot rolling of coil – the Steckel Mill .....	55
3.3	Cold rolling: tandem versus reversing .....	57
3.4	Zinc Coating: Hot dip- versus electro-galvanised .....	57
3.5	Tube: welded versus seamless .....	58
3.6	Temper mill versus skin-pass mill .....	58
4.	DISCUSSION .....	59
4.1	Investments .....	59
4.1.1	Investment summary .....	59
4.1.2	Investors .....	60
4.1.3	Locations.....	62
4.2	Cost components .....	63
4.3	Performance guarantees – India & China .....	65
4.4	Employment impact .....	67
4.5	The value added chain .....	69
4.6	Investment cost variability .....	70
4.6.1	The importance of output volume .....	70
4.6.2	Economies of scale .....	70
4.6.3	Other cost drivers .....	72
4.7	Investment trends .....	74
4.7.1	Product focus .....	75
4.7.2	Plant geography .....	75
4.7.3	Plant design .....	76
4.7.5	Adoption of new fuels and fuel types .....	77
5.	CAPEX COST vs CAPACITY CHARTS .....	79
6.	CONCLUSIONS .....	90