TECHNICAL UPGRADE AND EXPANSION OF ROLLING MILL

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1. Executive Technical Summary

Kamal Steels Limited, operational since 2004, proposes a major metallurgical process upgrade of its existing rolling mill line and dispatch handling systems. The scope includes the importation of high-precision rolling stands, automation modules, drive systems, reduction gearboxes, mill guides, loopers, and auxiliary electromechanical components from advanced manufacturing facilities in Chennai and Mumbai, India.

This engineering upgrade is targeted to:

- Increase rolling speed by 30–40% through improved stand rigidity, enhanced drive synchronization, and optimized pass schedules.
- Expand production from 5,000–6,000 MT/month to 7,000–8,000 MT/month, yielding an incremental gain of approximately 1,500 MT/month.
- Improve metallurgical consistency, bar dimensional tolerance, and mechanical strength properties.
- Reduce downtime through improved roll life, efficient size-change mechanisms, and advanced stand automation.
- Lower energy losses, reduce flywheel-related inefficiencies, and optimize motor-starter maintenance.

2. Company and Industrial Background

Kamal Steels Limited is one of Tanzania's leading manufacturers of Thermo-Mechanically Treated (TMT) reinforcement bars, operating with modern hot-rolling equipment and serving critical infrastructure sectors including bridges, roads, ports, industrial structures, and high-rise buildings.

The proposed investment aligns with:

- Tanzania Vision 2025
- Industrialisation Agenda and Import Substitution Strategy
- National Infrastructure Acceleration Requirements

3. Technical Scope of the Expansion Project

3.1 Rolling Mill Upgrade Components

The upgrade includes installation of:

- High-speed continuous stands with superior bearing systems

- Automated speed control systems (closed-loop VFDs & PLC-SCADA integration)
- Rapid-change roll cassette assemblies
- Enhanced mill guides and twist-free delivery systems
- Inter-stand tension control systems
- New reduction gearboxes and drive assemblies
- Energy-efficient motors replacing flywheel-dependent system.

3.2 Dispatch Area Upgrade

- Optimised material handling chain conveyors
- Automated bundling and tagging systems
- Improved yard logistics, enabling faster truck-loading efficiency

4. Engineering Improvements & Expected Technical Gains

4.1 Increase in Rolling Speed (30–40%)

The new continuous stands are engineered with:

- Higher stiffness modulus
- Reduced axial backlash
- Superior roll balance and alignment precision
- Optimized lubrication systems

This allows for higher linear speeds across the finishing mill, improving throughput without compromising bar uniformity**.**

4.2 Production Capacity Increase (1,500 MT/month)

Through improved cycle time, reduced cobbles, and steady-state high-speed rolling, monthly output will rise from 5,000–6,000 MT to 7,000–8,000 MT.

This is achieved by:

- Reduced changeover time
- Less rolling interruptions
- Better heat-retention and pass-schedule continuity

ODUCTION CAPACITY ASSESSMENT														
	ANNUAL PRODUCTION													
	Annual Production is based on	20	Hrs. Production & 4 Hrs. maintenance			Input		120 mm. Sq X 120 Mm.Sq						
	No. of working Hrs. in a day	20	Hrs.											
	No. of working days in a year	300	days			Product Range		TMT						
	No. of hours of mill operation	6000	Hrs.											
Fin. SizeDia (mms)	Raw Material			Fin. Bar Length (mts.)	Average Fin. speed (mts/sec)	Time of Rolling (Secs.)			Production Per Hour			Rolling scheme		Annual production (Tonnage)
	Type	Wt.(kgs)	Length (mts.)			Rolling	Idle	Total	Pieces	Tonnage	Effective Production	%age	Hrs.	
8	Billet	232	2.05	587.0	13.1	45.0	5.0	50.0	72	16.68	13.46	15	900	12119
10	Billet	232	2.05	376.0	9.7	39.0	5.0	44.0	82	19.00	15.33	25	1500	23002
12	Billet	231	2.04	260.0	7.3	36.0	5.0	41.0	88	20.29	16.38	20	1200	19652
16	Billet	234	2.07	149.0	4.8	31.0	5.0	36.0	100	23.40	18.88	10	600	11330
20	Billet	242	2.14	98.0	4.0	25.0	5.0	30.0	120	29.03	23.43	10	600	14056
25	Billet	236	2.09	62.0	3.3	20.0	5.0	25.0	144	34.02	27.45	5	300	8237
32	Billet	236	2.09	38.0	2.6	15.0	5.0	20.0	180	42.42	34.24	5	300	10271
	EFFECTIVE PRODUCTION IS CALCULATED AFTER CONSIDERING THE FOLLOWING													98667
	YIELD : For Billet – 95 % ,												SAY=	98600
	Mill Efficiency - 85%													

Improvement chart Per Annum

S. No	Sizes (mm)	Existing Production Chart	Production Sale ($)	Expansion Production Chart	Expansion Production Sale ($)
1	8	9594	4317300	12119	5453550
2	10	18234	8205300	23002	10350900
3	12	15633	7034850	19652	8843400
4	16	8951	4027950	11330	5098500
5	20	11128	5007600	14056	6325200
6	25	6864	3088800	8237	3706650
7	32	8560	3852000	10271	4621950
			35533800		**44400150**

Improvement Sales per Annum ($)	**8866350**

4.3 Improved Roll Life & Lower Roll Consumption

Low-diameter roll systems combined with advanced alloy roll materials offer:

- Better thermal fatigue resistance
- Less wear on pass grooves
- Reduced shock loads due to optimized inter-stand tension

Roll consumption will decrease significantly, lowering operational costs and downtime.

4.4 Fast and Efficient Size Change Operations

With continuous stand configuration:

- Size-change preparation can be done during mill operation
- Stand cassettes can be swapped out swiftly
- Adjustment time for bar sizes (8mm–32mm) is drastically reduced

This flexibility helps meet market-driven product mix requirements without major production loss.

4.5 Enhanced Finished Product Quality

Using high-precision stands and automated speed regulation:

- Better elongation control across passes
- Improved dimensional tolerance (±0.5 mm)
- Higher rib uniformity and bonding properties
- Achieves consistent yield strength (500–600 MPa) and elongation values required for modern structural projects

This also reduces rejections and improves compliance with TBS and international standards.

4.6 Automated Speed Control System

The closed-loop speed control integrated with PLC and SCADA ensures:

- Real-time adjustment of inter-stand tension
- Consistent rolling parameters
- Elimination of manual errors
- Significant reduction in cobbles, misalignment, and mechanical stress

This directly enhances metallurgical quality of the TMT rebars.

4.7 Reduced Power Consumption & Mechanical Losses

By replacing flywheel-type systems with direct-drive motors:

- Starter maintenance is reduced
- Energy wastage in flywheel inertia losses is eliminated
- Power factor improves
- Total connected load becomes more efficient

This contributes to sustainable and cost-effective rolling operations.

5. Economic, Industrial & Social Benefits to Tanzania

5.1 Employment and Skill Upgradation

Technicians and engineers will gain hands-on exposure to:

- Advanced rolling technologies
- PLC-SCADA automation
- High-speed metallurgical production controls
- Precision maintenance techniques

Local workforce capability will be uplifted significantly.

5.2 National Infrastructure Reliability

The upgraded mill ensures:

- Timely supply of TMT rebars
- Reduction of project delays in construction
- Greater availability of high-quality reinforcement steel

This supports ongoing and upcoming national mega-projects**.**

5.3 Alignment with National Industrial Policies

The project supports:

- Local value addition
- Import substitution

- Accelerated industrial growth
- Improved manufacturing competitiveness

6. Conclusions

The conclusions of a rolling mill expansion project generally center on increased production capacity, improved product quality, enhanced energy efficiency, and positive socio-economic impacts.