AI-based use case map for steel manufacturing

Mapped across every section of the steel manufacturing value chain — each process shows its inputs, output and KPIs, and each model what it analyses, predicts, and the advisory or detection it delivers, with indicative value per MTPA.

10	28	70
PLANT SECTIONS	UNIT PROCESSES	AI USE CASES

01 Mining

1 process · 2 use cases

Mining Operations

Drilling → Blasting → Loading → Hauling → Crushing

RM ROM ore, waste rock | UTILITY Diesel, electricity, water | OUTPUT Raw ore feed (lump + fines)

KPIs Fe%, moisture, lump:fines ratio, productivity (t/h)

Fleet Health & Productivity Monitoring

₹7 cr / MTPA steel

- Analyses telematics, engine, vibration, GPS and payload data from excavators, dumpers and drills along with operator behaviour patterns.
- Predicts component failures and identifies underperforming assets and operators.
- Provides advisory on optimal cycle times, dispatch and maintenance windows to lift fleet availability and productivity.

Material Handling Health Monitoring Computer Vision

₹1 cr / MTPA steel

Critical locations (maximum impact)

- Pit-to-crusher conveyor lines (long-distance, weather-exposed)
- Primary and secondary crusher feeds (blasting debris, tools, oversize rocks damage crusher)
- Stockpile-to-plant trunk belts (single-point failure for plant feed)

- Analyses camera images of belt surfaces and overhead camera feeds across conveyor lines and crusher feeds.
- Detects belt tears, mis-tracking, bearing degradation, tramp metal and oversize rocks on conveyor lines.
- Provides location-tagged alerts to stop belts or divert foreign material before crusher damage or belt failure.

02 Raw Material Preparation

5 processes · 14 use cases

Beneficiation

Crushing → Grinding → Classification → Magnetic Sep. → Thickening → Filtration

RM ROM iron ore | UTILITY Power, process water, reagents (collector, depressant) | OUTPUT Iron ore concentrate, tailings

KPIs Fe%, Fe recovery %, Blaine (grind size), moisture, kWh/t

Fe Recovery & Grinding Optimization

₹22 cr / MTPA steel

- Analyses feed ore characteristics, grinding mill power draw, classifier cut-points, magnetic separator currents and product assays.
- Predicts expected concentrate Fe% and grind energy by correlating process parameters with recovery outcomes.
- Provides advisory on Blaine target, classifier setpoints and separator current to push Fe recovery up and kWh/t down.

Sinter Plant

Raw Mix → Granulation → Ignition → Sintering → Cooling → Screening

RM Iron ore fines, coke breeze, fluxes (limestone, dolomite), return fines
UTILITY Mixed gas / COG (ignition), power, water
OUTPUT Fired sinter, exhaust gas
KPIs TI, RI, RDI, basicity (CaO/SiO_2), -5 mm fines%, productivity ($t/m^2/h$)

Sinter Quality & Productivity Optimization

₹17 cr / MTPA steel

- Analyses raw-mix composition, moisture, granulation, ignition profile, bed permeability, windbox temperatures and burn-through point.
- Predicts sinter TI, RI, RDI and basicity before the cake is produced.
- Provides advisory on raw-mix ratio, water addition, ignition setpoints and strand speed to hold quality on-spec while pushing strand productivity.

Sinter Bed Thermal Monitoring Computer Vision

₹2 cr / MTPA steel

- Analyses thermal images of the sinter bed across the strand.
- Identifies cold spots, hot zones and uneven burn-through patterns.
- Provides advisory on ignition adjustment, gas flow and strand speed to ensure uniform heat distribution and consistent sinter quality.

Material Handling Health Monitoring Computer Vision

₹1.5 cr / MTPA steel

Critical locations (maximum impact)

- Strand pallet circuit, grate-bar zones, dead-plate transitions, drive/return pulley stations
- Sinter strand discharge chute to cooler (hot, sticky material — blockage critical)
- Raw mix and coke breeze feed conveyors (oversize disrupts sinter quality)

- Analyses high-resolution camera images of pallets, grate bars, chutes and feed conveyors along the strand.
- Detects missing grate bars, broken pallet boards, chute blockages, mis-tracking and foreign material in raw mix.
- Provides location-tagged alerts for replacement and intervention before strand disruption.

Pellet Plant

Mixing → Balling → Drying → Preheating → Induration → Cooling

RM Iron ore concentrate, binder (bentonite), additives
UTILITY Power, NG / COG, water
OUTPUT Fired iron ore pellets
KPIs CCS, FeO%, porosity, reducibility, productivity (t/d)

Pellet Quality & Throughput Optimization

₹7 cr / MTPA steel

- Analyses concentrate fineness, binder ratio, moisture, balling parameters, induration zone temperatures, gas flows and cooling rate.
- Predicts pellet CCS, FeO, porosity and reducibility.
- Provides advisory on green-pellet recipe, induration profile and cooling air to lift quality and throughput together.

Kiln Ring Formation Prediction

₹5 cr / MTPA steel

- Analyses kiln shell temperatures, drive torque, gas flow patterns, feed chemistry and combustion parameters over time.
- Correlates these signals with historical ring-formation events to predict ring build-up days in advance.
- Provides early warning and advisory on feed/combustion adjustments to avoid unplanned shutdowns and protect campaign life.

Pellet Plant (cont.)

Mixing → Balling → Drying → Preheating → Induration → Cooling

Material Handling Health Monitoring — Computer Vision

₹0.5 cr / MTPA steel

Critical locations (maximum impact)

- Indurating machine pallet wheels and bearings (drag, jamming, sliding-wear failures)
- Pellet plant feed conveyors and balling drum chutes (foreign material disrupts balling)
- Fired pellet discharge to stockyard and cooler

- Analyses camera images of indurating pallet wheels, drive components, feed conveyors and discharge handling.
- Detects damaged pallet boards, jammed wheels, foreign material in concentrate feed and discharge issues.
- Provides location-tagged alerts before indurating machine disruption.

Coke Oven

Blending → Charging → Carbonization → Pushing → Quenching

RM Coking coal blend (hard + medium) UTILITY Mixed gas / BFG (heating), power, water (quenching)

OUTPUT Metallurgical coke, COG, tar, benzol, ammonia

KPIs CSR, CRI, ash%, S%, M40, M10, moisture

Coke Oven Golden Batch

₹16 cr / MTPA steel

- Analyses coal blend properties, charging weights, heating flue temperatures, coking time and battery operating conditions across historical heats.
- Identifies the 'golden batch' patterns linked to highest CSR and by-product yield.
- Provides advisory on blend ratio, charging recipe and heating profile to replicate best-heat performance.

Refractory Health Monitoring — Computer Vision

₹7 cr / MTPA steel

- Analyses high-resolution camera and thermal images of coke battery walls captured during pushing.
- Detects wall cracks, spalling, hot spots and structural degradation per oven chamber.
- Provides condition reports and prioritised repair recommendations to extend battery life.

Coke Quality Detection at Wharf — Computer Vision

₹7 cr / MTPA steel

- Analyses continuous visible-light and thermal/IR camera feeds of coke discharging onto the wharf.
- Detects green coke, hot embers, tar lumps, coke size distribution, fines content and surface defects in real time.
- Replaces manual sampling, protects downstream conveyors from belt fires and damage, prevents under-coked material reaching the BF, and feeds continuous quality data back into oven operations.

Material Handling Health Monitoring — Computer Vision

₹0.5 cr / MTPA steel

Critical locations (maximum impact)

- Wharf-to-screening conveyors (hot coke, fire risk on belts)
- Coke discharge chutes (hot coke sticking, downstream blockage risk)
- Coke screening to BF stockhouse trunk belts

- Analyses camera images and thermal feeds on coke handling belts and discharge chutes.
- Detects belt tears, hot embers (fire precursors), splice defects, mis-tracking and chute blockages.
- Provides alerts to prevent belt fires (₹2-5 lakh/event) and downstream BF feed disruption.

Lime Kiln

Charging → Calcination → Cooling → Handling

RM Limestone ($CaCO_3$) UTILITY Fuel (coal / NG / COG), combustion air, power, water OUTPUT Quicklime (CaO)

KPIs Available CaO%, reactivity (t60), LOI, fines%

Lime Quality & Fuel Optimization

₹2 cr / MTPA steel

- Analyses limestone feed characteristics, kiln temperature profile, fuel mix, residence time and exit gas composition.
- Predicts quicklime reactivity and available CaO.
- Provides advisory on temperature setpoints, fuel ratio and combustion air to tighten the reactivity band at lower fuel rate.

Ring Formation Prediction

₹1 cr / MTPA steel

- Analyses kiln shell temperatures, drive torque, draft pressure and feed/fuel chemistry over time.
- Correlates these with historical ring-formation events to predict early-stage ring build-up and process drift.
- Provides advisory on feed and combustion adjustments to protect kiln availability and campaign life.

Refractory Health Monitoring Computer Vision

₹0.5 cr / MTPA steel

- Analyses kiln shell IR/thermal scans, brick service history and operating conditions (temperature cycles, feed chemistry).
- Predicts refractory wear rate by zone and identifies emerging hotspots.
- Provides advisory on optimal reline windows to avoid forced outages.

03 Iron Making

3 processes · 11 use cases

Rotary Kiln DRI

Feeding → Heating → Reduction → Cooling → Magnetic Sep.

RM Iron ore (lump / pellet), non-coking coal, dolomite UTILITY Power, water (kiln shell cooling)

OUTPUT Sponge iron (DRI), char, ABM, off-gas

KPIs Metallisation%, FeT, FeM, C%, gangue, productivity (t/d), kWh/t

DRI Quality & Throughput Optimization

₹25 cr / MTPA steel

- Analyses iron ore feed characteristics, coal proximate analysis, kiln temperature profile, air/fuel ratios, retention time and product quality data.
- Predicts DRI metallisation %, carbon content and yield.
- Provides advisory on feed ratios, coal blend and temperature setpoints heat-by-heat to lift metallisation and kiln productivity.

Accretion Prediction

₹20 cr / MTPA steel

- Analyses kiln shell temperatures, drive amps, draft pressure and feed chemistry patterns over time.
- Correlates them with historical accretion events to predict build-up inside the kiln days in advance.
- Provides alerts and advisory on corrective action before forced shutdown.

Rotary Kiln DRI (cont.)

Feeding → Heating → Reduction → Cooling → Magnetic Sep.

Material Handling Health Monitoring — Computer Vision

₹1.5 cr / MTPA steel

Critical locations (maximum impact)

- Coal feed to kiln (oversize coal blocks charging chute, damages refractory)
- Iron ore feed to kiln (foreign matter triggers accretion and lining damage)
- Hot DRI discharge chutes (~1000°C — sticking is critical)
- Hot DRI product conveyors (special belt construction, severe wear)

- Analyses overhead cameras and thermal imaging on DRI feed and discharge handling.
- Detects oversize coal/ore, foreign material, hot DRI sticking, belt damage and chute blockages.
- Provides alerts to prevent kiln damage, accretion-inducing feed quality issues and downstream stops.

Shaft Furnace DRI

Gas Reforming → Shaft Reduction → Cooling → Discharge

RM DR-grade iron ore pellets UTILITY NG (reformed to H_2+CO), power, cooling water OUTPUT DRI / HBI

KPIs Metallisation%, C%, gangue, productivity, NG (Gcal/t)

DRI Quality & Throughput Optimization

₹30 cr / MTPA steel

- Analyses reformer gas composition (H_2/CO ratio), shaft pressure and temperature profiles, burden descent rate, pellet quality and reducing-gas flow.
- Predicts DRI metallisation, carbon content and product temperature.
- Provides advisory on reformer setpoints, shaft temperature and burden conditions to hit spec at higher throughput.

Reformer Efficiency Optimization

₹20 cr / MTPA steel

- Analyses reformer tube temperatures, catalyst performance, natural gas/steam ratios and exit gas composition.
- Predicts reformer efficiency and catalyst drift.
- Provides advisory on steam/gas ratio, burner balance and process gas inlet conditions to cut natural-gas use and tighten reducing-gas quality.

Material Handling Health Monitoring — Computer Vision

₹1 cr / MTPA steel

Critical locations (maximum impact)

- Pellet feed conveyors from stockyard to shaft top (long, plant-critical)
- Pellet charging chutes and top distribution
- Hot DRI discharge conveyors and chutes

- Analyses camera images on pellet handling conveyors plus chute and discharge monitoring.
- Detects belt tears, mis-tracking, foreign material in pellet feed and discharge chute blockages.
- Provides alerts to prevent shaft starvation and downstream EAF feed disruption.

Blast Furnace

Burden → Reduction → Melting → Hot Metal → Cast House

RM Sinter, pellet, lump ore, coke, PCI coal, fluxes

UTILITY Hot blast (O_2-enriched air), steam, power, water (stave cooling)

OUTPUT Hot metal, BF slag, BF gas

KPIs HM Si/S/P/C, slag basicity, productivity (t/m³/d), fuel rate (kg/THM), coke rate

Hot Metal Quality & Fuel Rate

₹12 cr / MTPA steel

- Analyses burden distribution, hot blast parameters, PCI coal injection, top gas composition and stockline measurements.
- Predicts hot metal Si, S, P, C and slag basicity heat-by-heat.
- Provides advisory on burden ratio, blast moisture/oxygen and PCI rate to hit chemistry on-aim and bring fuel rate down.

Hearth / Furnace-Top Thermal Monitoring

Computer Vision

₹8 cr / MTPA steel

- Analyses thermal images and IR signals from the hearth, furnace top and charging chutes.
- Detects abnormal heat patterns indicating refractory wear, gas channeling or charging blockages.
- Provides early alerts to prevent overheating, hot-iron breakouts and burden hangs.

Tuyere Monitoring

Computer Vision

₹2 cr / MTPA steel

- Analyses thermal images and video from tuyere peep-sights along with hot blast and PCI data.
- Detects raceway abnormalities, tuyere damage, dripping slag and combustion irregularities.
- Provides per-tuyere health status and advisory on blast/PCI rebalancing.

Cast House & Tap-Hole Monitoring

Computer Vision

₹2 cr / MTPA steel

- Analyses high-temperature camera feeds of the tap-hole, runners and slag skimmer during casting.
- Identifies tap-hole erosion, hot-metal splash patterns, runner refractory wear and slag carryover.
- Provides operator alerts and inputs for mudgun timing and skimmer adjustment.

Material Handling Health Monitoring

Computer Vision

₹2 cr / MTPA steel

Critical locations (maximum impact)

- Top distribution chutes (blockage halts BF charging - full production stop)
- Stockhouse transfer chutes (cascade failure to burden charging)
- Stockhouse charging conveyors (BF outage ~₹2-4 cr/day)
- Burden charging system (oversize coke/sinter causes BF hangs)

- Analyses camera images of chute interiors and burden-handling conveyors.
- Detects chute blockages, belt tears, mis-tracking, oversize material and burden charging anomalies.
- Provides location-tagged alerts to prevent BF charging disruption and burden hangs.

04 Ferro Alloy

1 process · 3 use cases

Submerged Arc Furnace (SAF)

Charging → Smelting → Tapping → Casting

RM Mn / Cr / Si ore, reductant (coke / coal), flux (quartz / limestone)

UTILITY Electricity, electrodes (Söderberg paste or pre-baked)

OUTPUT Liquid ferro alloy (FeMn / SiMn / FeCr / FeSi), slag, off-gas

KPIs Alloy chemistry (Mn / Si / C / P / S%), alloy recovery%, kWh/t, productivity

SAF Productivity, Quality & Recovery Optimization

₹45 cr / MTPA alloy

- Analyses charge mix, ore/reductant/flux quality, electrical power profile (voltage, current, electrode position), off-gas chemistry, slag chemistry, tap data and historical heat outcomes.
- Predicts kWh/t, alloy chemistry (Mn/Si/C/P/S), recovery rate, tap temperature and heat productivity ahead of tapping.
- Provides advisory on charge ratios, power input profile, electrode regulation, flux additions and tap timing to land alloy on-aim, push recovery and productivity, and cut kWh/t.

Electrode Health & Breakage Prediction Computer Vision

₹12 cr / MTPA alloy

- Analyses electrode current/voltage patterns, position signals, hydraulic feed data, paste consumption and thermal imagery of electrode columns.
- Predicts electrode wear rate, slipping issues and breakage risk in advance.
- Provides advisory on paste loading, slipping schedule and regulator tuning to prevent breakage and unplanned shutdown.

Refractory Health Monitoring Computer Vision

₹10 cr / MTPA alloy

- Analyses SAF shell thermal imagery, brick service history, slag chemistry and heat-load patterns.
- Predicts refractory wear rate by zone and identifies hot spots and at-risk areas.
- Provides advisory on patching, gunning and reline planning to extend lining life and prevent breakouts.

05 Steel Making

3 processes · 7 use cases

Basic Oxygen Furnace (BOF)

Charge → Flux → O_2 → Refining → Tapping

RM Hot metal, scrap, ferro alloys UTILITY Oxygen, lime, dolomite, argon (bottom stirring), nitrogen

OUTPUT Liquid steel, BOF slag, LDG (off-gas)

KPIs End-blow C/P/S/T, first-hit rate%, metallic yield%, tap-to-tap time

Steel Quality, Yield & Slag/Flux Optimization

₹15 cr / MTPA steel

- Analyses hot metal chemistry and temperature, scrap composition, flux additions, oxygen blow profile, sub-lance data and slag chemistry.
- Predicts end-blow C, P, S and temperature.
- Provides advisory on charge recipe, flux additions and oxygen blow pattern in real time to lift first-hit rate, improve P/S removal and protect metallic yield.

Electric Arc Furnace (EAF)

Charging → Melting → Refining → Slag → Tapping

RM Scrap, DRI / HBI, hot metal (mixed), lime, carbon (injection)

UTILITY Electricity, oxygen, NG (burners), electrodes, argon

OUTPUT Liquid steel, EAF slag, off-gas

KPIs kWh/t, electrode kg/t, tap-to-tap, metallic yield, end-tap C/P/S/T, foamy slag

EAF Heat and Energy Optimization

₹20 cr / MTPA steel

- Analyses scrap mix, DRI/HBI feed, electrical power profile, oxygen and carbon injection, foamy slag practice and off-gas data.
- Predicts end-of-heat temperature, chemistry and energy consumption.
- Provides advisory on charge sequence, power input pattern and injection practice to shorten tap-to-tap and cut kWh/t while protecting yield.

Electrode Health & Breakage Prediction

Computer Vision

₹15 cr / MTPA steel

- Analyses electrode current/voltage patterns, vibration, hydraulic feed signals and thermal imagery of electrode arms and columns.
- Predicts electrode wear rate, instability and breakage risk in advance.
- Provides advisory on regulator tuning, segment replacement timing and lift schedules to prevent breakage.

Refractory Health Monitoring

Computer Vision

₹12 cr / MTPA steel

- Analyses EAF shell thermal imagery, brick service history, slag chemistry and heat-load patterns.
- Predicts refractory wear rate by zone and identifies hot spots and at-risk areas.
- Provides advisory on hot-patching, gunning and reline planning to maximise lining life and prevent breakouts.

Material Handling Health Monitoring

Computer Vision

₹2 cr / MTPA steel

Critical locations (maximum impact)

- Scrap yard belts feeding furnace (tramp metal in scrap = single biggest catastrophic risk)
- Scrap bucket charging conveyors (heavy-duty, sharp scrap damages belts)
- DRI/HBI charging conveyors for mixed-charge EAFs
- Lime and carbon injection feed lines

- Analyses overhead camera feeds of scrap and feed handling systems.
- Detects tramp metal (sealed containers, gas cylinders, contraband), oversize scrap and belt damage.
- Provides alerts to prevent EAF damage events (₹5-20 cr per major tramp metal incident) and belt failures.

Secondary Metallurgy

LF → VD/RH → CAS-OB → CC Ready

RM Liquid steel from BOF/EAF, ferro alloys, lime, slag formers

UTILITY Electricity (LF arc), argon, vacuum (VD/RH), oxygen (CAS-OB) OUTPUT Refined liquid steel (ready for caster)

KPIs Final chemistry on-aim, tundish temperature, inclusion cleanliness, H/N gas content

Steel Chemistry & Temperature Advisory

₹15 cr / MTPA steel

- Analyses tap chemistry/temperature, alloy additions, ladle arc heating, vacuum degassing parameters, argon stirring patterns and slag conditions across LF/VD/RH stages.
- Predicts arrival chemistry and temperature at the tundish.
- Provides advisory on alloy quantities, heating time, vacuum cycle and stirring to land every heat on-aim.

Ladle & Tundish Tracking

₹2 cr / MTPA steel

- Analyses per-ladle and per-tundish history (preheating, fill duration, refractory age, transit time) along with thermal-loss patterns.
- Predicts heat loss per vessel and refractory life remaining.
- Provides advisory on ladle scheduling and preheating to extend refractory life and prevent cold heats.

06 Casting

1 process · 4 use cases

Continuous Casting

Tundish → Mold → 2° Cooling → Straightening → Cutting

RM Liquid steel (from sec met), mould powder, casting consumables UTILITY Water (mould + 2° cooling), power, hydraulic

OUTPUT Slabs / blooms / billets

KPIs Surface defects, internal cracks, dimensional accuracy, rhomboidity, sticker rate

Casting Quality, Mould Powder & Oscillation Optimization

₹12 cr / MTPA steel

- Analyses tundish temperature/superheat, mould level oscillation, casting speed, mould powder consumption, secondary cooling water flow and historical defect data.
- Predicts surface and internal quality (cracks, stickers, segregation).
- Provides real-time advisory on casting speed, mould level setpoints, oscillation frequency, mould powder feed and 2° cooling pattern to cut surface defects and stickers.

Thermal Breakout Prediction Computer Vision

₹10 cr / MTPA steel

- Analyses real-time thermal images of the mould and embedded mould thermocouple data.
- Detects abnormal heat patterns indicating shell thinning, stickers and stuck shells before they become breakouts.
- Triggers automatic casting-speed reduction and operator alerts.

Billet/Bloom/Slab Surface & Shape Quality Monitoring Computer Vision

₹5 cr / MTPA steel

- Analyses high-resolution camera and laser-scanner data of cast billets, blooms and slabs leaving the caster.
- Detects and classifies rhomboidity, dimensional deviations, longitudinal/transverse cracks, corner defects, bulging, twist and surface anomalies.
- Flags defective sections before they enter downstream rolling.

Continuous Casting (cont.)

Tundish → Mold → 2° Cooling → Straightening → Cutting

Slag Detection at Tapping / Pouring

Computer Vision

₹3 cr / MTPA steel

- Analyses thermal and visible-light camera feeds during ladle tap and tundish pour.
- Identifies slag carryover from steel-stream colour and temperature signatures.
- Triggers automatic ladle slide-gate closure to minimise slag in steel and protect cleanliness.

07 Rolling

3 processes · 9 use cases

Reheating Furnace

Charging → Preheating → Heating → Soaking → Discharge

RM Cold / hot-charge slabs, billets, blooms

UTILITY Fuel (NG / COG / mixed gas), combustion air, power, water

OUTPUT Heated stock (ready for rolling)

KPIs Discharge temperature uniformity, scale loss%, residence time, fuel rate (Gcal/t)

Reheating Fuel & Yield Optimization

₹10 cr / MTPA steel

- Analyses slab/billet stock dimensions and grade, zone temperatures, air/fuel ratios, residence time and discharge temperature profile.
- Predicts discharge temperature uniformity and scale loss.
- Provides advisory on zone setpoints, walking-beam pacing and air/fuel ratio to hit target temperature at lower fuel and yield loss.

Burner & Refractory Health

₹5 cr / MTPA steel

- Analyses burner flame stability, gas flow, zone temperature deviations and refractory shell IR data.
- Predicts burner drift, refractory wear and emerging hotspots.
- Provides advisory on burner tuning, gunning and maintenance windows before furnace availability is impacted.

Hot Rolling Mill

Descaling → Roughing → Finishing → Cooling → Coiling

RM Heated slabs from reheating furnace

UTILITY Power, cooling water (ROT, mill stands), hydraulic, work rolls

OUTPUT Hot-rolled coil (HRC), plate

KPIs Thickness, width, profile, crown, flatness, YS/UTS/elongation, finishing/coiling temp

HRM Quality & Throughput

₹15 cr / MTPA steel

- Analyses slab grade and dimensions, finishing/coiling temperatures, mill stand forces, gauge/profile readings and ROT cooling pattern.
- Predicts strip thickness, profile, crown and mechanical properties.
- Provides advisory on pass schedule, finishing temperature and ROT cooling to hit dimensional and metallurgical targets at full mill speed.

Hot Rolling Mill (cont.)

Descaling → Roughing → Finishing → Cooling → Coiling

HRM Surface Defect Detection

Computer Vision

₹12 cr / MTPA steel

- Analyses continuous high-speed camera feeds of hot strip surfaces.
- Detects and classifies surface defects (scale, scratches, holes, edge cracks, scabs, slivers) per coil.
- Maps defect type and location for downstream sorting, trimming decisions and quality reporting.

HRM Roll Health & Wear

₹4 cr / MTPA steel

- Analyses roll force, torque, slip, cooling water effectiveness, surface roughness inspections and rolled-meter data per roll.
- Predicts roll wear rate, surface damage and remaining useful life.
- Provides advisory on optimal change-out windows to maintain strip surface quality and mill availability.

Cold Rolling Mill

Pickling → Cold Rolling → Annealing → Skin Pass

RM Pickled HRC

UTILITY Power, rolling oil / emulsion, hydraulic, work rolls, HNX gas (annealing)

OUTPUT Cold-rolled coil (CRC) — full hard, annealed, skin-passed

KPIs Thickness tolerance, crown, flatness, surface roughness, mechanical properties post-anneal

CRM Thickness, Profile & Flatness Optimization

₹10 cr / MTPA steel

- Analyses incoming HRC quality, mill stand forces, rolling speed, tension, bending/shifting, gauge meters and flatness sensors.
- Predicts strip thickness, crown and flatness deviations.
- Provides advisory on gap control, tension distribution, bending forces and skin-pass settings to tighten gauge, profile and flatness end-to-end.

CRM Surface Defect Detection

Computer Vision

₹15 cr / MTPA steel

- Analyses continuous high-resolution camera feeds of cold-rolled strip surfaces.
- Detects and classifies scratches, dents, pits, roll marks and stains in real time.
- Maps defect type and location per coil to drive quality dispositioning and reduce customer claims.

CRM Roll Health & Wear

₹4 cr / MTPA steel

- Analyses roll force, slip, vibration, surface roughness and work-roll/back-up-roll usage history.
- Predicts roll wear rate and surface degradation curves.
- Provides advisory on grind and replacement windows to time changes for quality and availability.

Annealing Cycle & HNX Gas Optimization

₹8 cr / MTPA steel

- Analyses strip dimensions, grade, furnace zone temperatures, dew point, HNX gas flow, line speed and exit mechanical properties.
- Predicts annealed strip properties and surface quality.
- Provides advisory on zone temperature profile, line speed and HNX/dew-point setpoints to shorten cycle time and cut HNX consumption.

08 Finishing

2 processes · 5 use cases

Color Coating Line (CCL)

Clean → Pretreat → Primer → Top Coat → Cure

RM GI / GA coil, paint (primer + top coat), pretreatment chemicals

UTILITY Power, NG (curing oven), thermal oil

OUTPUT Color-coated coil (PPGI / PPGL)

KPIs Coating thickness (DFT), adhesion, color uniformity, gloss, T-bend, MEK rub

Coating Quality & Paint Consumption Optimization

₹20 cr / MTPA steel

- Analyses pretreatment chemistry, primer/topcoat film thickness, line speed, oven temperature profile and visual quality data.
- Predicts coating appearance, adhesion and uniformity.
- Provides advisory on roller settings, paint viscosity, oven setpoints and line speed to lift quality while reducing paint consumption.

CCL Surface Defect Detection

Computer Vision

₹8 cr / MTPA steel

- Analyses high-resolution camera feeds of color-coated strip surface.
- Detects and classifies coating defects (streaks, craters, scratches, dents, color non-uniformity) in real time per coil.
- Maps defect location for trim/repair decisions and customer-claim prevention.

Continuous Galvanizing Line (CGL)

Clean → Anneal → Zn Pot → Air Knife → Cool → Recoil

RM CRC, zinc ingot, Al (bath), fluxes

UTILITY HNX gas (annealing), power, NG (snout / induction), cooling water

OUTPUT Galvanized coil (GI / GA)

KPIs Coating weight (GSM), surface quality, mechanical properties, spangling, bare spots

Coating Weight & Zinc Optimization

₹50 cr / MTPA steel

- Analyses zinc bath temperature/chemistry, air-knife pressure/distance, strip speed, line tension and inline GSM gauge readings.
- Predicts coating weight (GSM) on both strip surfaces.
- Provides advisory on air-knife setpoints, bath conditions and line speed to hit GSM targets at lower zinc consumption.

CGL Surface Defect Detection

Computer Vision

₹8 cr / MTPA steel

- Analyses high-resolution camera feeds of galvanized strip surface.
- Detects and classifies bare spots, dross pickup, scratches, sag lines and coating imperfections in real time per coil.
- Maps defects for downstream quality decisions and customer-claim reduction.

Zinc Pot Health Monitoring

₹5 cr / MTPA steel

- Analyses zinc pot temperature, bath chemistry (Al, Fe, Pb), dross accumulation rate, roll vibration and immersion-roll performance data.
- Predicts dross formation, pot roll wear and equipment drift.
- Provides advisory on bath top-ups, skimming schedule and roll change-out to protect coating consistency and line availability.

09 Utilities

4 processes · 6 use cases

Air Separation Unit (ASU)

Compression → Purification → Cryogenic Sep. → Distribution

RM Atmospheric air UTILITY Power OUTPUT O_2, N_2, Ar (gaseous + liquid)

KPIs O_2 / N_2 / Ar purity, production rate (Nm^3/h), kWh/Nm^3

ASU Production, Purity & Energy Optimization

₹5 cr / MTPA steel

- Analyses ambient conditions, compressor/turbine loads, cold-box temperature profiles, distillation column conditions, plant gas demand and storage levels.
- Predicts production volumes and purity for O_2, N_2, Ar.
- Provides advisory on load split, compressor loading and column setpoints to match demand at the lowest kWh/Nm^3.

Captive Power Plant (CPP)

Fuel → Boiler → Steam → Turbine → Generator

RM Fuel (coal, NG, BFG / COG / LDG by-product gas) UTILITY Demineralised water, combustion air

OUTPUT Electricity, process steam

KPIs NHR (kcal/kWh), aux power%, steam parameters, PLF, availability%

NHR & Auxiliary Power Optimization

₹5 cr / MTPA steel

- Analyses boiler combustion parameters, steam temperatures/pressures, turbine performance and BoP equipment loads.
- Predicts net heat rate (NHR) and auxiliary power consumption.
- Provides advisory on excess-air, soot-blowing, steam conditions and pump/fan loading to bring NHR and auxiliary power down.

Boiler & Turbine Health

₹3 cr / MTPA steel

- Analyses boiler tube temperatures, heat-transfer efficiency, vibration patterns, fuel/ash chemistry and turbine cylinder efficiencies.
- Predicts tube fouling, leak risk and performance deterioration.
- Provides advisory on soot-blowing, load adjustments and inspection windows to protect availability.

Material Handling Health Monitoring Computer Vision

₹1 cr / MTPA steel

Critical locations (maximum impact)

- Coal handling plant (CHP) belts to boiler (failure halts power generation)
- CHP crusher and mill feeds (tramp metal damages liners)
- Ash handling conveyors and chutes (sticking causes boiler shutdown)
- Boiler coal feed sampling and distribution

- Analyses camera images of CHP belts, crushers and ash handling.
- Detects belt tears, tramp metal, crusher damage precursors, ash sticking and CHP downtime risks.
- Provides alerts to prevent CHP shutdown and boiler starvation.

Gas Network (BFG / COG / LDG)

Generation → Holders → Distribution → Consumers

RM By-product gases (BFG, COG, LDG) UTILITY Power (compressors, holders)

OUTPUT Distributed fuel gas to consumers across plant

KPIs Calorific value (kcal/Nm³), holder level%, distribution pressure, flaring loss

Fuel Gas Network Optimization & Forecasting

₹8 cr / MTPA steel

- Analyses BFG, COG, LDG generation rates, gasholder levels, calorific values and consumer demand patterns across the plant.
- Forecasts gas balance ahead of demand swings.
- Provides advisory on holder targets, distribution split and auxiliary-fuel use to minimise flaring losses and replace bought fuel with by-product gas.

Energy Management System (EMS)

UTILITY Real-time data feeds from all consuming units OUTPUT Energy KPIs, dashboards, optimization advisory

KPIs Specific energy consumption (kcal/t or kWh/t), benchmark deviation, savings tracked

Energy Management System (EMS)

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- Analyses real-time electricity, fuel, steam, gas and water consumption across every consuming unit, benchmarked against best-of-shift and design norms.
- Identifies high-consumption assets, abnormal patterns and savings opportunities.
- Provides advisory on load shedding, scheduling and efficiency interventions.

10 Cross-Cutting

5 areas · 9 use cases

Digital Foundation

IT-OT Integration

₹5 cr / MTPA steel

- Connects and contextualises data from PLCs, DCS, historians, MES, ERP, LIMS and field IoT devices into a unified namespace.
- Provides the clean, time-aligned data fabric — with built-in security and governance — that every downstream analytics and AI use case depends on.

Quality Management

LIMS Integration & Quality Intelligence

₹5 cr / MTPA steel

- Analyses lab assay results from LIMS joined with process parameters, production logs and customer-feedback data across the value chain.
- Identifies which process conditions correlate with quality outcomes.
- Provides root-cause insights and quality dashboards for faster operator and metallurgist decisions.

Quality Management (cont.)

Material Genealogy & Traceability

₹5 cr / MTPA steel

- Links every coil, plate or section back through its slab, heat and raw materials, joining chemistry, process logs, sensor data and defect records.
- Enables root-cause investigation in minutes when a quality issue surfaces and provides full forward/backward traceability for customer claims.

Asset Reliability

Condition-Based Monitoring (CBM)

₹15 cr / MTPA steel

- Analyses vibration, temperature, motor current, oil-quality and process data from critical rotating (motors, pumps, fans, gearboxes) and static assets.
- Detects anomaly patterns indicating bearing wear, misalignment, imbalance or process drift.
- Predicts failure modes and provides advisory on maintenance actions and timing.

MRO & Spare-Parts Optimization

₹3 cr / MTPA steel

- Analyses historical spare-part consumption, equipment criticality, lead times, CBM-predicted failure signals and inventory data.
- Forecasts spare-parts demand.
- Provides advisory on stock levels, reorder points and criticality-driven prioritisation to cut MRO inventory cost while protecting asset availability.

Computerised Maintenance Management System (CMMS)

₹5 cr / MTPA steel

- Analyses equipment fault history, CBM alerts, work order data, technician schedules, spare-parts availability and planned shutdown windows.
- Predicts optimal work order scheduling, MTTR, resource conflicts and reactive-vs-planned maintenance ratio.
- Provides automated work order generation from CBM alerts, predictive scheduling, mobile-first execution and maintenance KPI dashboards (MTBF, MTTR, planned-to-reactive ratio).

Safety

AI Safety Monitoring Computer Vision

₹5 cr / MTPA steel

- Analyses live CCTV feeds across operating areas.
- Detects PPE non-compliance (helmet, gloves, harness), restricted-area entry, unsafe behaviours near hot/moving equipment and hazardous conditions (smoke, spills).
- Triggers supervisor alerts and incident logs in real time.

Ops Intelligence

Plant-Wide KPI & OEE

₹5 cr / MTPA steel

- Analyses production, quality, energy and asset performance data from every unit in real time.
- Computes OEE, specific energy, yield and cost-per-tonne KPIs, benchmarked across shifts, lines and sites.
- Provides dashboards and drill-downs for management decisions.

Production Planning & Scheduling

₹10 cr / MTPA steel

- Analyses order book, customer due-dates, grade-mix rules, line capacities, changeover constraints, raw-material availability and equipment status.
- Predicts feasible production schedules.
- Provides advisory on order sequencing, line assignments and resource allocation to lift throughput and on-time delivery.

From use-case map to plant outcome

Faclon's industrial AI operating layer connects, contextualises and acts on plant data across the steel value chain — turning this map into measurable gains in OEE, yield, energy efficiency and asset availability.