

## Metallurgical equipment

### BILLET CONTINUOUS CASTING MACHINES

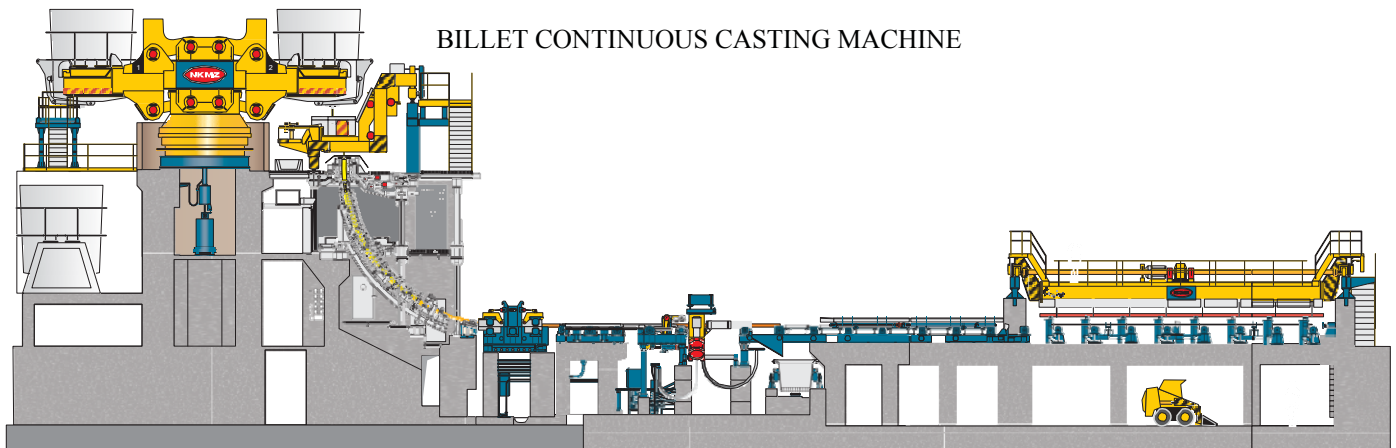
Machines for continuous casting of billets (Billet CCMs) developed by NKMZ implement modern high-performance technologies of continuous casting of high-quality steel products. Machine technology and design is based on own advanced scientific, engineering and project solutions. Technical level of CCM is being constantly improved with wide involvement of research and development design institutes closely cooperating with NKMZ in this line.



#### BASIC ENGINEERING SOLUTIONS AND ADVANTAGES:

- Optimal form of tundish internal surfaces;
- Tundish change while pouring;
- Fast pouring nozzle change;
- Pouring with metal jet protection from secondary oxidation;
- High-speed mould;
- Electromagnetic stirring system in the mould;
- Strand autostart;
- Dynamic secondary cooling model;
- Smooth billet unbending system in two-phase state under NKMZ technology;
- Stamping of billets in the flow;
- Optimal workpiece layout system;
- Optimized billet cooling and handling scheme;
- High level of automation;
- Continuous measuring and monitoring of casting technological parameters;
- Modular replacement of main production assemblies;
- High level of unification and interchangeability;
- High level of equipment and system reliability;
- Low operation and maintenance costs;
- Easy operation and maintenance;
- Safety of workspaces.

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### MAIN INNOVATIVE SOLUTIONS IN SPHERE OF BILLETS CONTINUOUS CASTING

- High speed mould;
- Systems of electromagnetic influence on ingot;
- Highly-effective shape of mould tube;
- Activities aimed at reduction of specific consumption parameters values of the continuous casting process;
- Quality assessment systems and certification systems of continuously cast billets in flow;
- Diagnostic systems for equipment testing in operational mode;
- Optimization of equipment parameters and of continuous casting modes;
- Upgrading of casting process in tundish.

#### Technical characteristics

Parameter	Value
Type of CCM	Radial
Basic radius,m	8...9
Number of strands, pcs.	2...6
Capacity of CCM, thousand tons per	300...1200
Cast section	Square 100x100...210x210 mm, Round $\varnothing$ 120...220 mm
Cast steel grades	- commercial quality grades; - qualitative low-, middle-, and high-carbon steels; - low-alloyed grades; - stainless grades;
Speed of casting, m/min.	up to 5,5...6,0 (square 100 mm) up to 3,3...3,5 (square 150 mm)
Casting practice	Stopper casting under level, Open-jet casting
Mould	"Smart" mould
Oscillator	Spring hydraulic or electromechanical
Electromagnetic stirring system	In the mould area/in the secondary cooling area
Primary cooling	Single circuit, flow rate into slots up to 15 m/sec.
Ingot unbending	Smooth unbending

