

## AL20 - Smart Tools and QuickConnect for Enhanced Safety of Casthouse Operations

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### Abstract



Today, there is an increased awareness of safety in aluminium casthouses. Molten metal explosions remain an industry concern. Over the years, many safety measures were put in place, starting with better fitting personal protective equipment (PPE). However, a brief overview of the latest incidents reveals that we still need further improvements. Safety in casthouse operations is Mecfor's battle horse. Twenty years ago, it was bold to think that one sturdy vehicle, coupled with dedicated tools, could perform all casthouse operations and auxiliary tasks. Over time, Mecfor Casthouse Solution concept has proven its efficiency by increasing safety and optimizing the fleet. This approach addresses many of the high-risk factors found in a casthouse that can be much reduced: co-activity, exposures to molten metal splashes, and visibility. Today, the equipment can safely charge 42 tonnes of aluminium into a melting furnace in less than 20 minutes, using a single machine offering versatility for other tasks. Using a very efficient hydraulically-powered QuickConnect system coupled with the right tool for a task brings many benefits such as: reducing the operation time and associated energy loss, causing less refractory damage, and most of all, ensuring the safety of operators. In addition, Mecfor Smart Tool option allows to limit the speed and power of the machine functions depending on the tool that is in use. Sequencing and programming of a tool can help control the human factor and limit the risk of incidents. Monitoring and analysis are also key to understand how to alleviate risks. To that effect, Mecfor offers an array of technologies such as operator ID, 360-degree camera recorder, and MecforLink telemetry system. For decades, Mecfor has been perfecting its complete casthouse solution concept: applied technology for better safety and productivity, no room to compromise.

**Keywords:** Casthouse productivity, casthouse safety, Mecfor Casthouse Solution, Mecfor Smart Tool, casthouse efficiency.

### 1. Challenges Found in Aluminium Casthouse

Back in September 1967, it took a major accident in the USA to trigger awareness to safety in a casthouse. Still today, the Aluminum Association monitors molten metal explosions, which remain an industry preoccupation. Over the years, many safety measures were put in place, starting with better fitting personal protective equipment (PPE) and pedestrian dedicated walkways. Most recently, co-activity in casthouses raises concerns.

#### 1.1. Ideas Brought to Life

Safety in casthouse operations is Mecfor's battle horse. Twenty years ago, it was bold to think that one sturdy vehicle, coupled with dedicated tools, could safely perform all casthouse operations and auxiliary tasks. Over time, Mecfor team has visited many casthouses, participated in numerous customers' safety reviews and has heard all ins and outs aiming for one objective: designing the most complete and optimal Casthouse Solution. In numbers, this translates into:

- More than 100 different Casthouse multipurpose vehicles designed and manufactured since 2003 offering a wide range of lifting capacity (from 6750 kg to 15 750 kg);

- 525 different tools designed and built;
- 915 furnace tending blades, from which 64 different designs are available.

## 1.2. Proven Efficiency: from Past to Future

Mecfor's Casthouse Multipurpose Vehicle (MVR) Solution is the result of expertise from solutions implemented over time from which we have learned and we are always improving (see Figures 1 and 2). With new coming technologies, we are adapting the equipment to make operations easier, safer, and more constant. Mecfor's strength and sustained presence in this sector is positioning the company ahead to think and design the 'Casthouse of the Future' integrating more robotization and auto guided vehicles (AGV), leading the industry into a fully computerized monitored Industry 4.0 environment.



**Figure 1. Mecfor Casthouse Solution - MVR and tools.**

Mecfor Smart Casthouse Solution has proven its efficiency. Nowadays, optimized processes, increased safety, and production rate are of great concerns. Is it possible to design a machine that can perform all casthouse tasks safely and efficiently? Mecfor equipment can safely charge 42 tonnes of aluminium into a melting furnace in less than 20 minutes, using a single machine offering versatility for other tasks from the bottom cleaning to the alloys mixing. This approach addresses many of the high-risk factors such as molten metal splashing hazards and interactions with pedestrians. In fact, using Mecfor's Casthouse Multipurpose Vehicle Solution allows all operations without having anyone walking in the furnace area.

Managing casthouse operations implies co-activity and many aspects that must be taken into consideration. Changing tool or equipment from prime to scrap charging, alloy charging, dross removal, stirring, crucible handling, dross bin handling, furnace cleaning, spout cleaning and more. Could it be possible to use the same machine for all these tasks without having to leave the driver's seat?

## 2. Increased Safety and Productivity: No Room to Compromise

Safety is a necessity; no one will work his best if he risks injury or death. How many times a day does your operator need to climb in and out of its vehicle between each task? Are some requiring longer preparation to hook tools properly? Is he safe at all time? Safety is a culture of continuous improvement often based on lessons learned.

At Mecfor, we bear this in mind and offer an ergonomic work environment so that the operator could focus on the job that needs to be done. Mecfor has designed a built-to-last vehicle that is supremely versatile. The vehicle can be coupled easily to specially-engineered customized smart tools to perform specific operations. The operator can switch from one tool to another in less than 15 seconds, using a push button to rigidly lock it onto the mast apron. The hydraulic-

## **6. Conclusion**

For decades, Mecfor has been perfecting its Smart Casthouse Solution. By identifying the root cause with its customer, Mecfor team designs a Smart Casthouse Solution tailored for that customer. The goals are: restricting bad practices, reducing number of equipment required, limiting co-activities between pedestrians and vehicles, thus lessening risks of accident. Mecfor Smart Casthouse Solution with QuicKconnect technology provides a quick return on investment and a safer workplace for the workers.