

CESAB Mast Technology



Industry leading visibility and performance



CESAB



A passion for engineering

- *Designed and engineered exclusively within the CESAB group*
- *A collaboration between designers, engineers and production specialists to set new standards in mast performance*
- *State of the art design and manufacturing*

Engineering the optimal forklift truck mast presents multiple challenges. Yet it is exactly the type of challenge that inspires CESAB's passion for engineering.

CESAB believe that the mast is key to safe and productive materials handling and has brought together a team of specialist engineers, designers and production specialists to create Intelligent Mast Design (IMD).

IMD is a pioneering concept intended to set new mast technology standards across Europe. Drawing on CESAB's engineering heritage, along with state of the art design and manufacturing techniques, the project has achieved industry leading levels of

visibility and performance.

The same passion for improvement has also been applied to the production of CESAB masts at the LTE factory. Here, every member of the production process is empowered with quality control through the use of the renowned TPS*.

CESAB's passion for engineering is matched by LTE's passion for high quality production, using state of the art manufacturing techniques to minimise the impact on the Environment.

*Toyota Production System



3 Wheel Electric



4 Wheel Electric



Heavy Duty Electric



IC Engine Powered

Outstanding performance: standard across the CESAB range

By applying the IMD concept to the design of each individual truck, CESAB has created a range of counterbalanced forklifts that offer outstanding performance across an extensive range of applications.

From a compact 3-wheel electric forklift, that offers class leading manoeuvrability, to an 8.5 tonne electric forklift, that delivers cleaner and quieter heavy duty performance, there's a CESAB forklift to suit your business.

The combination of IMD and CESAB's flexible manufacturing process also mean truck performance can be further tailored to the specific demands of your materials handling operation. Special attachments,

such as paper handling clamps, or specialist masts such as quadriplex or cold store and tannery versions are all available, bringing outstanding performance to even the most specialised industries.

The benefits of IMD are not limited to CESAB's highly acclaimed electric forklifts. A range of IC engine powered forklifts with lifting capacities from 1.5 tonnes to 3.5 tonnes bring class leading visibility and performance to even the most demanding applications.

- *1.0 tonne - 8.5 tonne electric powered forklift range*
- *1.5 tonne - 3.5 tonne IC engine powered forklift range*
- *Specialist masts and attachments bring the benefits of IMD to even the most specialised applications*



Smarter design leads to higher performance

- *Industry leading levels of visibility from optimised structural design and the use of two FFL cylinders.*
- *Machined mast profiles and adjustable rollers help save energy and reduce noise in operation*

Achieving maximum materials handling performance requires the seamless integration of a forklift's component parts. CESAB believes that the best way to achieve this is through an integrated design process that begins and ends with the needs of the end user.

Superior forward visibility

Operator visibility is critical to achieving high productivity safely. IMD provides operators with industry leading levels of visibility through the use of two FFL cylinders, along with the integration of all cables and hydraulic hoses within the mast uprights.

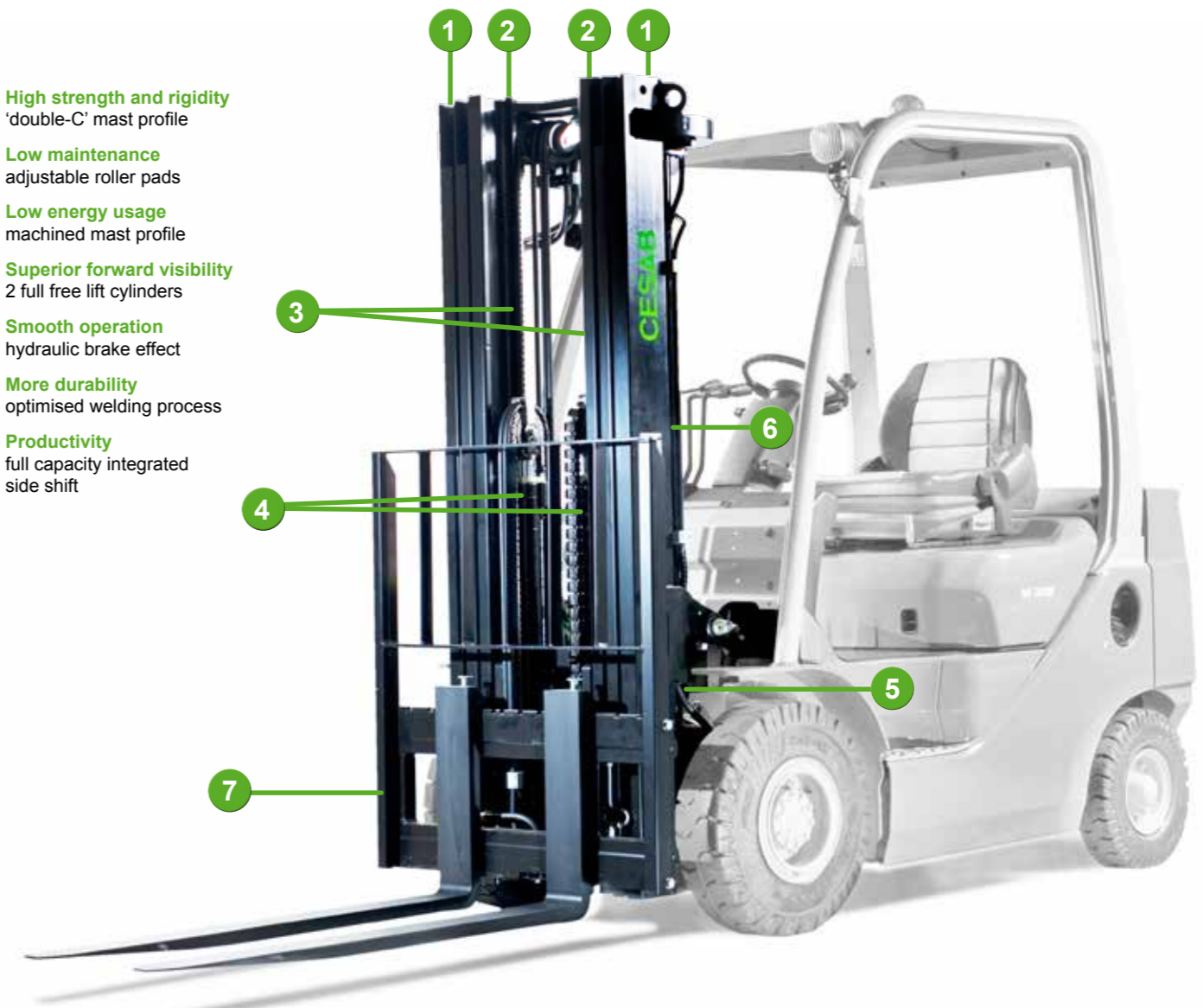
The design of the load bearing structure, the profile shape, tie bars, cylinders

and other components have also been optimised to provide maximum visibility without compromising on strength, rigidity or the controlled flex required to maintain stability with loads at height.

Lower energy usage

Machined mast profiles and adjustable rollers virtually eliminate longitudinal and lateral play meaning less wasted energy. The shorter profile of IMD masts helps create a more compact and lighter counterweight further reducing energy consumption.

1. **High strength and rigidity**
'double-C' mast profile
2. **Low maintenance**
adjustable roller pads
3. **Low energy usage**
machined mast profile
4. **Superior forward visibility**
2 full free lift cylinders
5. **Smooth operation**
hydraulic brake effect
6. **More durability**
optimised welding process
7. **Productivity**
full capacity integrated side shift



Superior forward visibility



Low energy usage



Low maintenance



High strength and rigidity



Smooth, quiet operation



More durability

Industry leading mast technology

Lower maintenance

IMD helps to reduce life time cost by incorporating adjustable roller pads allowing for quick and easy maintenance.

High strength and rigidity

Patented 'Double-C' mast profile provides great strength and rigidity and increases stability when operating with loads at height.

Smooth operation

A hydraulic braking effect during the end stroke phases ensures smooth, quiet operation. This achieves a high level of load stability and helps reduce fatigue and stress in the working environment

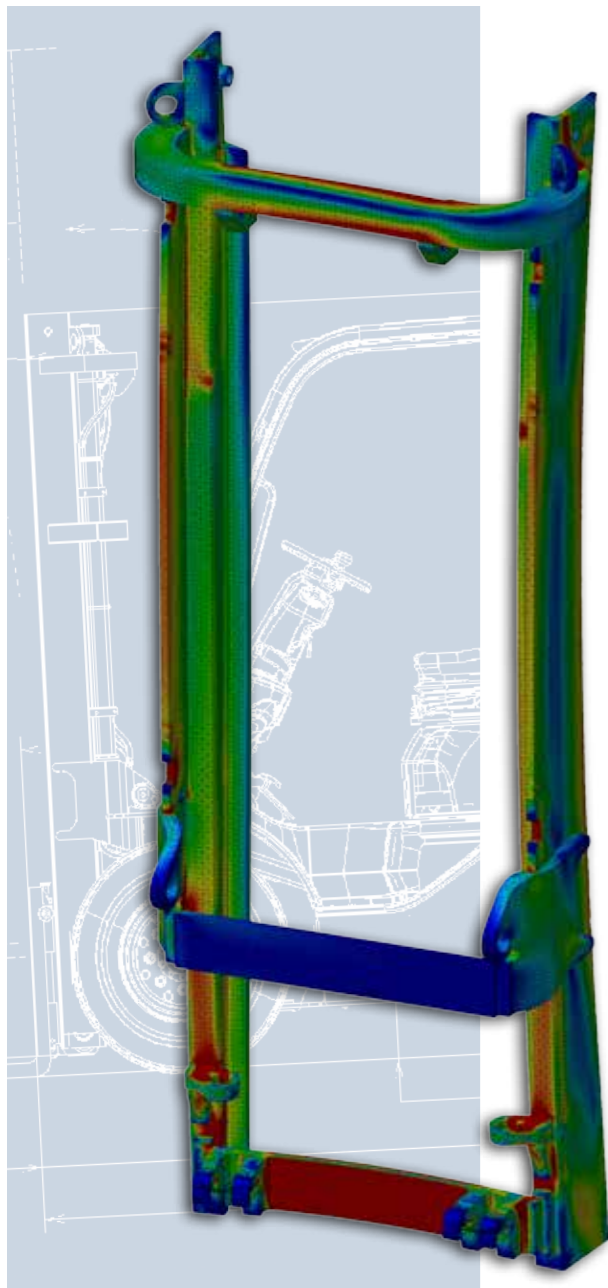
for the operator and colleagues.

The hydraulic controls and mast's actuators have been designed as a single system, contributing to excellent operator performance in terms of speed, load stability and precision positioning effortlessly

More durability

The strength of the mast is further increased by using an optimised welding process in manufacturing. This results in a high performance mast, helping to reduce stress and wear and providing high protection against mast damage.

- *Reduced lifetime cost with lower maintenance*
- *Patented 'Double-C' mast profile provides increased strength and rigidity*
- *Hydraulic braking effect ensures smoother, quieter operation*
- *Optimised welding process ensure strength and durability where it is needed*



Dedicated mast factory



Toyota Production System



Environmental management



Full mast range

Learning from over 50 years experience

- *CESAB's continuous improvement approach has led to over 50 years of innovation*
- *State of the art 3-D CAD and FEM analysis optimise designs*
- *IMD brings significant improvements in residual capacity, precise movement and no deflection. during handling.*

For more than 50 years CESAB has taken a continuous improvement approach to developing its products. Today customer feedback is combined with state of the art technology to test, refine, then retest every product before it is brought to market.

IMD presented CESAB's design team with the challenge of finding the ideal balance of functionality, ergonomics, stability, lifespan and performance.

Designs were modelled using 3-D Computer Aided Design (CAD) before being subjected to Finite Element Model (FEM) analysis, a computerised simulation that highlights how the forces on the mast affect its rigidity and

durability. Welded structures, mast stages and fork carriages were all subjected to severe load simulations to identify the best solution. Only then were prototypes manufactured by LTE's engineers.

Both complete prototypes and individual components were subjected to rigorous bench testing. Only after passing these tests were further prototypes tested on the forklift truck.

CESAB has produced a range of masts that genuinely set new standards for visibility and performance with significant improvements in residual capacity, precise movement and no deflection. during handling.

Built to the highest standard

The CESAB mast range is manufactured by LTE, part of the CESAB group, using the world renowned TPS*. Every step of manufacture, from sourcing raw materials to final delivery, is closely monitored to ensure high quality standards are maintained.

The principles of TPS, such as Just in Time Manufacturing, Jidoka and Kaizen, not only ensure high quality but also identify opportunities for continuous improvement and help to minimise impact on the environment.

The layout of the LTE factory has been optimised to allow for the most efficient flow of materials. A new oxi-cut warehouse

feeds four robot welders where the type of weld used is optimised for each particular joint. The oxi cut, machining and welding processes are constantly monitored and, if a problem occurs, that phase is stopped until the problem is solved. The two final phases of the manufacturing process, painting and assembly, are carried out on automated painting and assembling lines.

LTE also operates a dedicated mast cylinder workshop, where a clean process protects against contaminants and ensures high quality standards.

* Toyota Production System

- *All CESAB counterbalanced masts are built at LTE's dedicated factory*
- *Production capacity of 15,000 masts per year*
- *Manufactured using renowned TPS**
- *Certified ISO 14001 processes maximise efficiency and minimise environmental impact*



The data in this brochure was determined based on our standard testing conditions. Operating performance may vary depending on the actual specification and condition of the truck as well as the condition of the operating area. Availability and specifications are determined regionally and are subject to change without notice. Please consult your authorised CESAB dealership for further details. BR_IMD_EN_2013 / P&B IMD V20 - Copyright CESAB Material Handling Europe.

