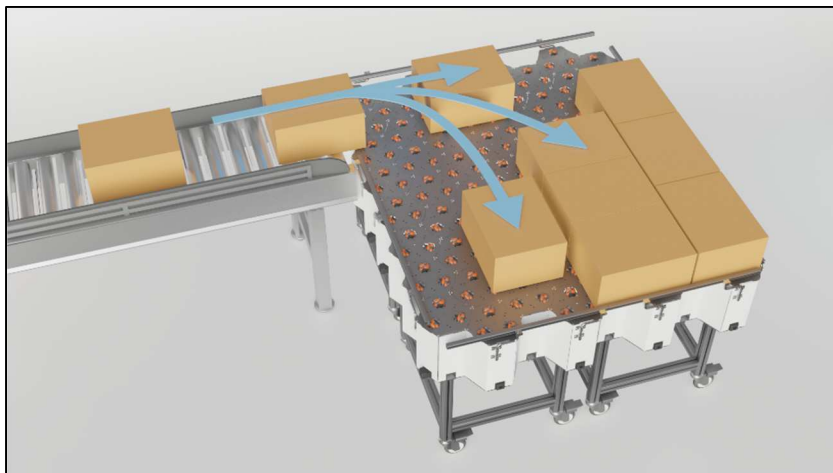


System description celluveyor

Example application “Layer forming for automatic palletizing – *celluveyor PAL*”



1 Introductory remarks

This document describes the specification and functionality of the *celluveyor* for “layer forming for automatic palletizing”, the *celluveyor PAL*.

2 Product information *celluveyor PAL*

2.1 Description *celluveyor* technology

The *celluveyor* is a modular conveyor based on the patented cellular concept. Each cell consists of a hexagonal base plate with three omnidirectional wheels and a control unit (figure 1). Each wheel is driven individually by an electric motor. By individually controlling the speeds of the wheels and the interaction of adjacent cells, objects can be freely rotated and conveyed in every direction. Multiple objects at the same time can be moved in free paths and independently of each other.

The control system is based on a semi-decentralized concept, consisting of a (central) industrial PC and the (decentralized) control units installed in each cell. The task is defined on the central part of the control and realized by the cells themselves.

Because of its modular design, the cells can be easily combined into conveying surfaces with any dimension and shape (figure 2). Thanks to the cellular concept and the omnidirectional capabilities, complex material flow applications can be performed on the *celluveyor* on minimal space.

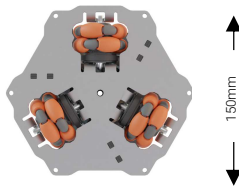
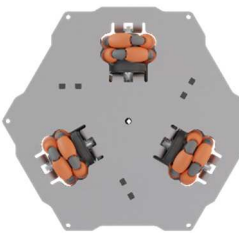


Figure 1: *celluveyor* cell top and side view



Figure 2: *celluveyor* system

Cell size: The *celluveyor* is available with two different cell sizes. The size of the cell most suitable for your palletizing application depends on the smallest object to be conveyed (see table below).

	150 cell	200 cell
Minimum size of objects that can be transported (L x W):	150x150mm	200x200mm
		

2.2 Functional description *celluveyor PAL*

The *celluveyor PAL* enables the formation of layers of common secondary packaging (e.g. cardboard boxes and trays) for automated palletizing, in any layer pattern and any pallet format (figure 3). The *celluveyor PAL* can change between layer patterns without any mechanical adjustments and can also form layer patterns with gaps and holes (please contact cellumatation for more information about gaps and holes in layer patterns).

Dimensions (mm)	Dimensions (Inches)	Region	Supported in standard <i>celluveyor PAL</i> configuration
1067 x 1067	42.00 x 42.00	North America, Europe, Asia	Yes
1200 x 800	47.24 x 31.50	Europe	Yes
1200 x 1000	47.24 x 39.37	Europe, UK, Asia	Yes
1219 x 1016	48.00 x 40.00	North America	Yes
1100 x 1100	43.30 x 43.30	Asia	Additional cells needed
1140 x 1140	44.88 x 44.88	Australia	Additional cells needed

Table 1: Supported pallet formats

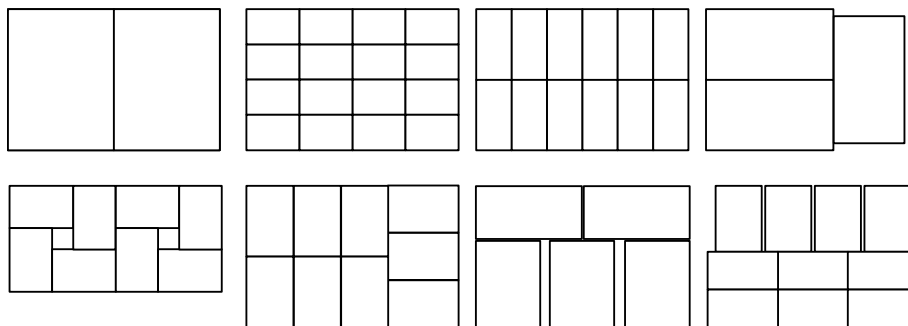


Figure 3: Sample patterns that can be formed with the *celluveyor PAL*

2.3 System description of the *celluveyor PAL*

The *celluveyor PAL* in its standard configuration consists of:

- the *celluveyor* table
- control cabinet
- feedback system (including camera and camera pole)
- control software
- graphical user interface for:
 - layer pattern configuration
 - path planning

Graphical user interface (GUI): The *celluveyor PAL* is delivered with an intuitive graphical user interface.

Layer pattern configuration: The final layers can be configured by drag and drop and saved for later use.

Path configuration: In a second step, the movement of the objects on the *celluveyor* surface to form the configured layers must be defined. For this path configuration, the *celluveyor PAL* offers two alternative software packages (*celluveyor PAL Basic* and *celluveyor PAL Pro*).

	<i>celluveyor PAL Basic</i>	<i>celluveyor PAL Pro</i>
Layer configuration	Manually (drag&drop)	Manually (drag&drop)
Path configuration	Manually (drawing)	Calculated automatically

After layer and path configuration are completed, the *celluveyor PAL*'s software controls the omnidirectional wheels in the manner that the desired layer is formed of the incoming objects on the conveying surface.

Once the layer has been completed, it can be picked up by a robot, or optionally be forwarded to an outbound buffer conveyor.

celluveyor table layout "compact":

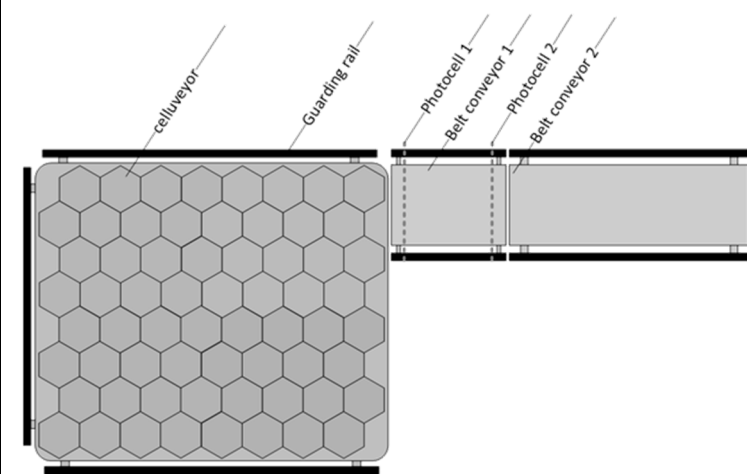


Figure 4: celluveyor full setup (200 cell)

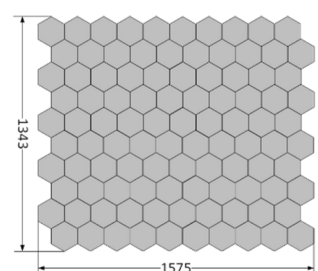


Figure 5: Dimensions of the celluveyor conveying surface (150 cell)

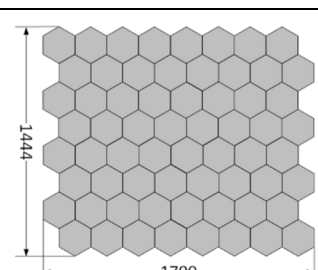


Figure 6: Dimensions of the celluveyor conveying surface (200 cell)

Technical description:

Celluveyor Type:	200 cell	150 cell
Cell size	200mm	150mm
Number of cells	64	100
Dimensions per table	1470mm x 1730mm	1369mm x 1605mm
Dimensions conveying surface	1444mm x 1700mm	1343mm x 1575mm
Height of system (conveying surface)	900mm (variable)	
Transported objects (minimum size)	200mmx200mm	150mmx150mm
Transported objects (bottom surface)	Flat	
Maximum conveyed cases	40 cases/minute	
Layers formed	4 layers/minute @ 10 cases/layer	
Maximum transported weight (per object)	30kg	
Minimum transported weight (per object)	1kg	
IP rating	IP23	
Ambient temperature (min-max)	5°-35°C	
Humidity (min-max)	5%-80%	
Noise level	< 70dB	

Control cabinet (electrical specifications):

Celluveyor type	200 cell	150 cell
Nominal voltage	400VAC/50Hz	
Nominal current	13A	20A
Connection type	IEC-60309 32A 4 plug	
Upstream circuit breaker	20A Type C	32A Type C
Short circuit capacity	10kA	
IP Rating (electrical cabinet)	IP54	
Ambient temperature (min-max)	5°-35°C	
Humidity (min-max)	5%-80%	

3 Integration in material flow systems

The *celluveyor PAL* integrates into all state-of-the-art material flow systems, in the standard version through an inbound conveyor and an outbound robot.

Inbound: The material flow system hands over the objects to be palletized through an inbound conveyor. The objects passed need to have a minimum gap of at least 0.1m to ensure detection by light barrier. The *celluveyor PAL* gives the signal that a new object shall be “handed over” to the conveying surface. The conveyor belt is not included in the scope of delivery.

Outbound: The *celluveyor PAL* is designed in its standard configuration so that formed layers are lifted from the *celluveyor PAL* by a robot using a layer gripper. Other options - as for example an outbound buffer conveyor - are possible (not included in the standard scope of delivery).

Communication interface: The *celluveyor* communicates with the higher-level material flow system with I/O and TCP/IP. Other supported interfaces are Profinet, Profibus, Ethercat and Modbus (not included in the scope of delivery).