

Design Manual for M.C.M.E.L Platform System

FOR

DESIGNERS, ENGINEERS, ARCHITECTS,
CONTRACTORS & INSTALLERS.



Prepared and approved by:
Patrice Austin, ing.

Digitech 3D inc.

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1 - USES OF platforms

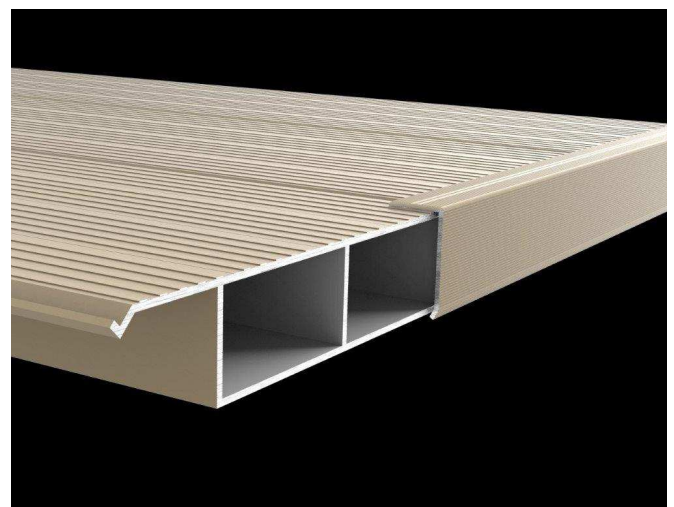
Decks, terraces, balconies, staircases and mezzanines are used in homes and in residential, commercial, and industrial buildings to ensure support, stability and safety at a certain height to users. Generally, it names platforms.

Platform consists specifically of a horizontal structure include beams, braces and spacers, supported by columns at a certain height from the ground.

The platform can be attached to the building or be standing alone. Component parts, the posts, which support horizontal and vertical loads transferring them to various floors by means of anchorages. The handrails are fixed to the surface and structure of the platform. The assembly must be able to support and transfer the static and dynamic loads in accordance with NBC's requirements.

These components can be constructed from different materials such as wood, steel, aluminium, plastic, or a combination of two or more materials (a hybrid).

FIGURE 1: COMPONENT PARTS OF BOARDS



Aluminium components have several advantageous characteristics such as resistance to corrosion and bad weather, higher mechanical resistance and are relatively lightweight. Notably for these reasons, aluminium structure systems are widely used in the construction industry for the external perimeters of balconies, footbridges, staircases, etc.

M.C.M.E.L. is a family business that encourages a creative environment, and is always up-to-date on the newest industry developments so as to offer innovative products to its clients. The company distinguishes itself by offering products that are within reach of all budgets while recognized for their elegance, durability, ease of installation, and low maintenance.

This manual is a design and installation guide for engineers, architects, designers, and installers of aluminium and wooden platform structure recovered with aluminium boards. In this way, installers can determine the type of beams and spacing between them, the arrangement of component parts comprised in the system and the specifications for all anchoring as required.

Following codes are applicable in Platform system design:

- National Building code of Canada 2010
- Ontario Building Code 2012
- CAN/CSA-S157-05/S157.1-05 (R2010) - Strength Design in Aluminum

2 - M.C.M.E.L PLATFORM SYSTEMS

M.C.M.E.L. offers a platform system including boards and aluminum structure. It suits many applications as platform, deck, mezzanine, balcony and staircase. The structure can be designed with wood or with M.C.M.E.L aluminum extrusions in convenience with Canadian standards. Boards are made in aluminum with M.C.M.E.L exclusive extrusions.

FIGURE 2: M.C.M.E.L WOOD COLOR BOARD



FIGURE 3: M.C.M.E.L EXCLUSIVE EXTRUSIONS

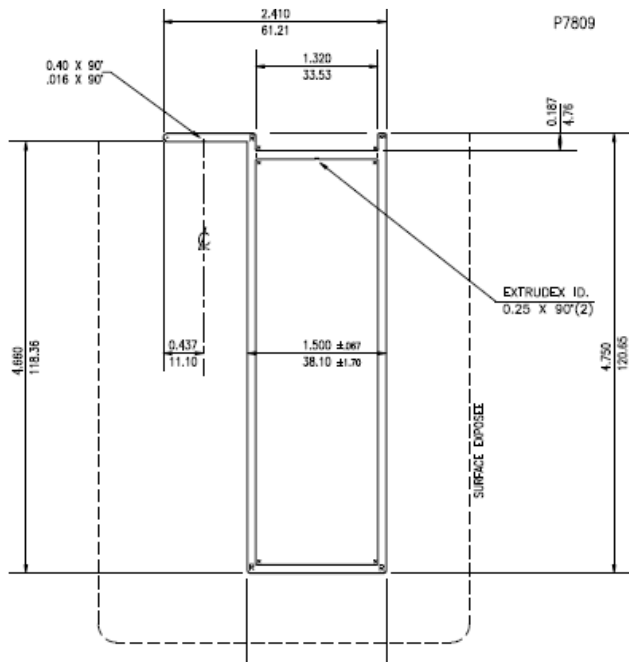


FIGURE 5: M.C.M.E.L EXCLUSIVE CLOSED BOARDS

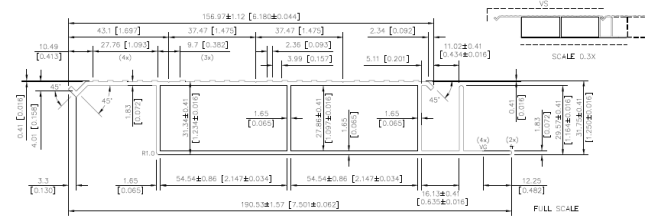


FIGURE 6: M.C.M.E.L EXCLUSIVE OPEN BOARDS

SECTION NO : PMCM 3849
(2nd. After Modified)

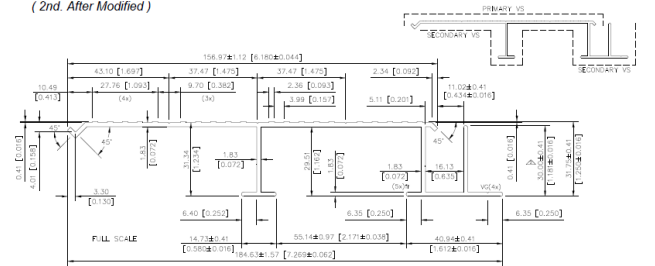
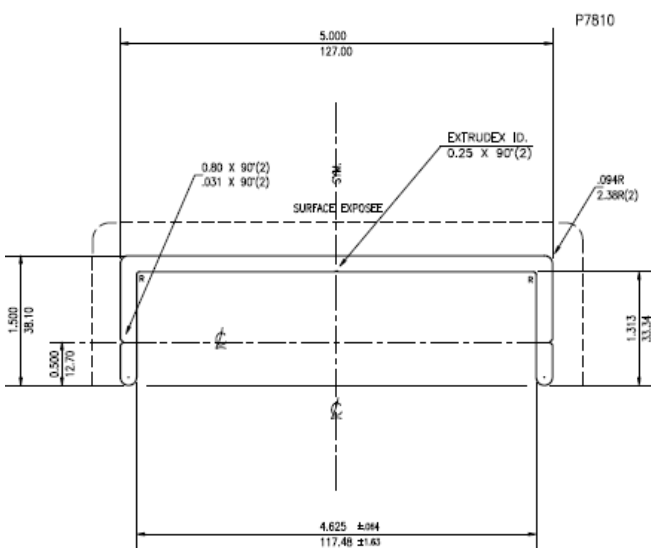


FIGURE 4: M.C.M.E.L EXCLUSIVE EXTRUSIONS



3 - PHYSICAL PROPERTIES

Conforming to CSA standard S175-05 calculation of aluminium structures, the physical characteristics of aluminium alloys are the following:

- Modulus of elasticity, $E = 70,000 \text{ MPa}$
- Shearing module, $G = 26,000 \text{ MPa}$
- Linear coefficient of thermal expansion, $\alpha = 24 \times 10^{-6} / ^\circ\text{C}$
- Poisson coefficient, $\nu = 0,33$
- Density, $\rho = 2700 \text{ kg/m}^3$

The properties of the sections of the component parts used for M.C.M.E.L platform systems are showed in tables 1, 2 and 3. The mechanical and physical properties of components of the railing system are used in order to evaluate the bearing capacity of these component against the stress of the external loads imposed by Codes.

4 - MECHANICAL PROPERTIES

Mechanical properties of the railing system components used in M.C.M.E.L products are in accordance with the CAN/CSA-S157-05/S157.1-05 R2010) - Strength Design in Aluminum and appeared in table 3.

TABLE 1: SECTION PROPERTIES OF EXTRUSIONS (SEE FIGURES 3 TO 6 FOR EXAMPLES OF DRAWINGS)







Profils d'aluminium	1	 XH59427	$A = 758 \text{ mm}^2$ $V_r = 38 \text{ kN}$ $M_r = 2,99 \text{ kN.m}$ $I = 1,3E+6 \text{ mm}^4$
	2	 XH59427 doublé	$A = 1516 \text{ mm}^2$ $V_r = 75 \text{ kN}$ $M_r = 5,98 \text{ kN.m}$ $I = 2,6E+6 \text{ mm}^4$
	3	 XS59426	$A = 914 \text{ mm}^2$ $V_r = 45 \text{ kN}$ $M_r = 4,09 \text{ kN.m}$ $I = 1,9E+6 \text{ mm}^4$
	4	 XS59426 doublé	$A = 1828 \text{ mm}^2$ $V_r = 90 \text{ kN}$ $M_r = 8,18 \text{ kN.m}$ $I = 2,8E+6 \text{ mm}^4$
	5	 PMCM 3849	$A = 981 \text{ mm}^2$ $V_r = 49 \text{ kN}$ $M_r = 1,26 \text{ kN.m}$ $I = 1,5E+5 \text{ mm}^4$
	6	 DECK7269	$A = 541 \text{ mm}^2$ $V_r = 27 \text{ kN}$ $M_r = 0,55 \text{ kN.m}$ $I = 8,0E+4 \text{ mm}^4$



TABLE 2: SECTION PROPERTIES OF STANDARD EXTRUSIONS USED IN THE M.C.M.E.L PLATFORM SYSTEM




7	 H 5" x 3" x 1/4"	A = 1835 mm ² Vr = 91 kN Mr = 8,8 kN.m I = 6,29E+6 mm ⁴
8	 H 6" x 3" x 1/4"	A = 1835 mm ² Vr = 91 kN Mr = 8,8 kN.m I = 6,29E+6 mm ⁴
9	 H 8" x 5" x 3/8"	A = 3690 mm ² Vr = 159 kN Mr = 25,0 kN.m I = 24,7E+6 mm ⁴

TABLE 3: SPECIFICATION OF ALUMINUM ALLOY USED FOR M.C.M.E.L PRODUCTS

	Fu	Fy traction	Fy Compression
6063-T5	150 MPa (21.8 ksi)	110 MPa (16.0 ksi)	110 MPa (16.0 ksi)
6063-T5 (posts)	205MPa (29.8 ksi)	170 MPa (24.7 ksi)	170 MPa (24.7 ksi)
6063-T54 (posts)	230 MPa (33.4 ksi)	205 MPa (29.8 ksi)	205 MPa (29.8 ksi) 3



5 - DESIGN PROCEDURE

5.1 LOADS

For residential application under 3 levels structure, loads applied on the decking systems, according to NBC 2010 and Ontario Building Code 2012, are 55 psf (Dead Load = 40 psf + Live Load = 15 psf). Loads considered are the excess loads due to usage. Permanent load, dynamic load and snow load are considered in this load case.

Please note these loads are specified in this manual for wooden and aluminum structure for residential applications. Designer shall consult M.C.M.E.L for further information or different applications.

6 - STRUCTURAL DESIGN

The load distribution and the structural analysis of the different railing systems are determined in accordance with the following parameters:

- Horizontal area of the platform;
- Number of column support the platform;
- Distance between supporting columns.
- Type of material of the structure (wood or M.C.M.E.L. aluminum extrusions).

Structural design and verification has been performed according CAN/CSA-S157-05/S157.1-05 (R2010) - Strength Design in Aluminum and wooden structure, According to the Ontario Building Code 2012 and NBC 2010.



8 - DESIGN STAGE OF RAILING SYSTEMS

1. Determine dimensions of the platform (Span A and Span B);
2. Determine the number of column on each span to find distance between them;
3. Choose distance between beam or length of braces (16 or 24 inches);
4. Choose type of structure:
 - a. For Wooden Structure, use DI-003-001_RAP-0002-A (wooden structure);
 - b. For Aluminum structure, use 2014-10-30-Gaviko, McMel S0@S4;
 - c. These documents are provided by M.C.M.E.L.'s team to distributors, engineers, architects, contractors. You can see the first page of each document in figures 7 and 8, below.
 - d.
5. According to the load combinations and dimension, evaluate components and assembly to respect Ontario Building Code 2012 and NBC 2010;

FIGURE 7: DI-003-001_RAP-0002-A

