Newsletter Vol.1 No. 5 May 2012

# PLPAK NEWSLETTER

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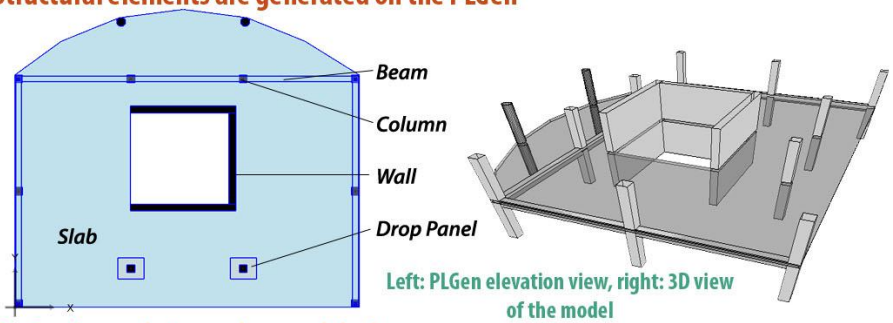
## Designing Through the PLDesign

### Geometrically accurate design and detailing

The following are the steps to analyze, design and detail a reinforced concrete simple floor using the PLDesign. Proper geometrical modeling is required to produce an "as-built" system with accurate detailing against the most popular reinforced concrete design codes. The steps for design and detailing are demonstrated:

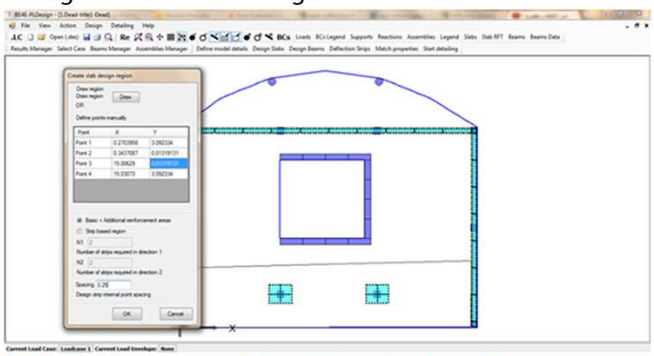
**1) Structural elements are generated on the PLGen**

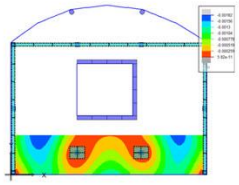



Left: PLGen elevation view, right: 3D view of the model

**2) Region is ready to analyze and design**

The generated model is sent to the PLDesign for analysis and design. As shown, a region of the slab is selected to perform the design steps on. The region is initially analyzed producing the values on the right.

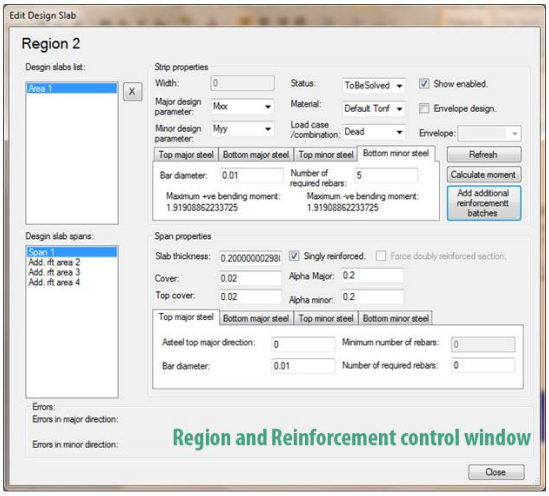




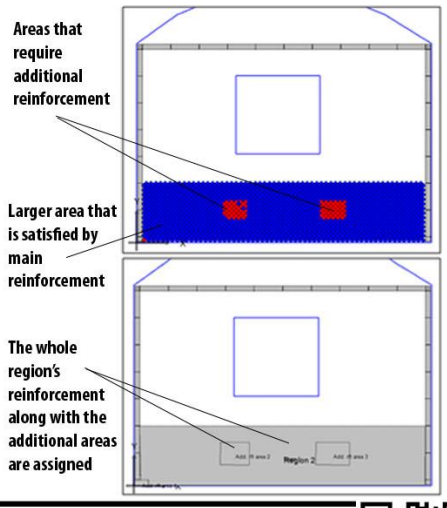
Mxx values for the selected region

**3) Reinforcement meshs for slab are designed**

The region selected is designed by applying main top and bottom reinforcement to satisfy the majority of the region. This is achieved by considering that the main reinforcement would resist a certain maximum bending moment, while any region parts that exceed this moment are highlighted in red. The highlighted regions would require additional reinforcement. Both main and additional reinforcement are determined by the user.




Region and Reinforcement control window

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**DEVELOPMENT**

**The PLPAK software is in constant development to meet the needs of industrial and research purposes. Updates to the software will be posted monthly.**

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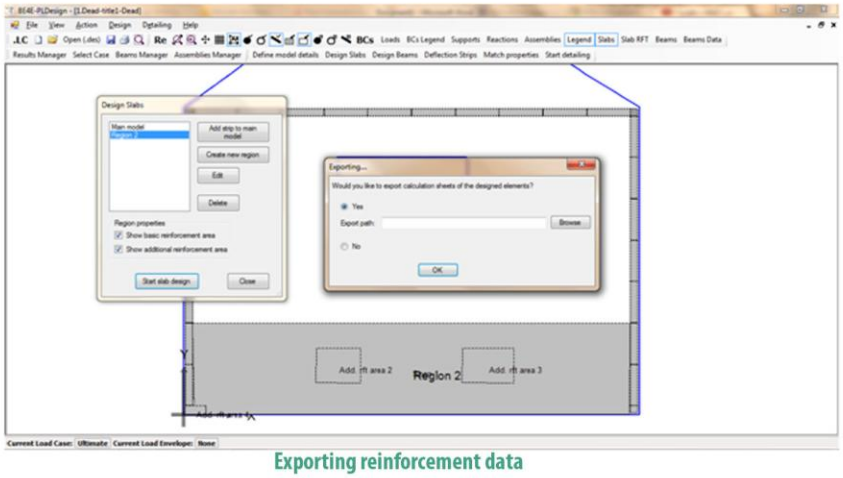
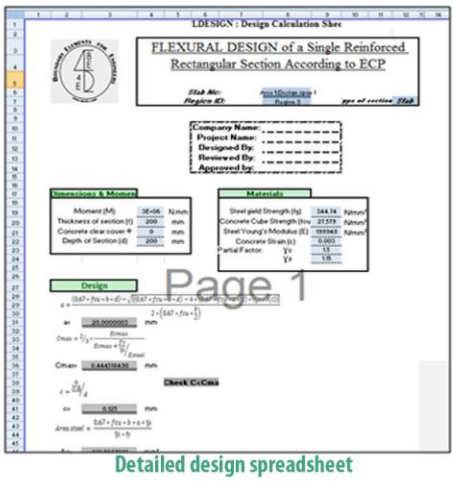
## 4) Data exported to spreadsheets:

After the region is reinforced, the user can now export design details of the slab to a spreadsheet with info related to design code choice, material choice and section dimensions, and code requirements and checks.



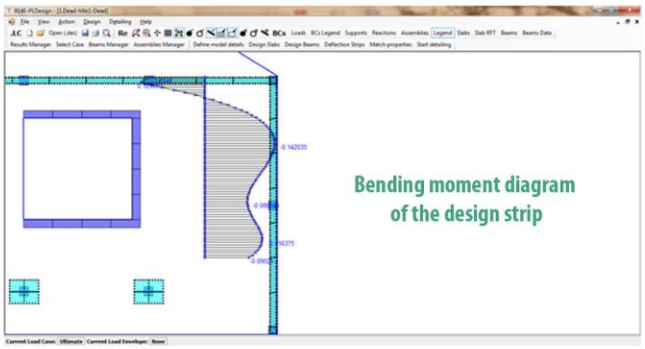

Exporting reinforcement data



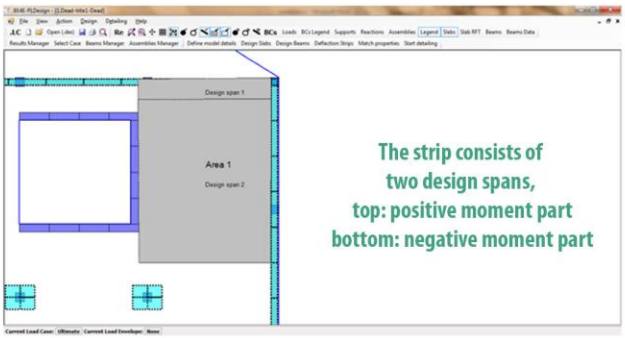

Detailed design spreadsheet

## 5) Strip Design (Slab Design alternative):

Another method to slab design available in the PLDesign is the «Strip Design» method. The user is capable of drawing a strip to analyse. The bending moment achieved for this strip is then demonstrated, with positive and negative values appearing along the line. Each time the bending moment changes along the strip, a new span is created to distinguish between positive and negative moment parts. These design spans represent a changeable width perpendicular to the strip's length, therefore reinforcement results are spread along the width.



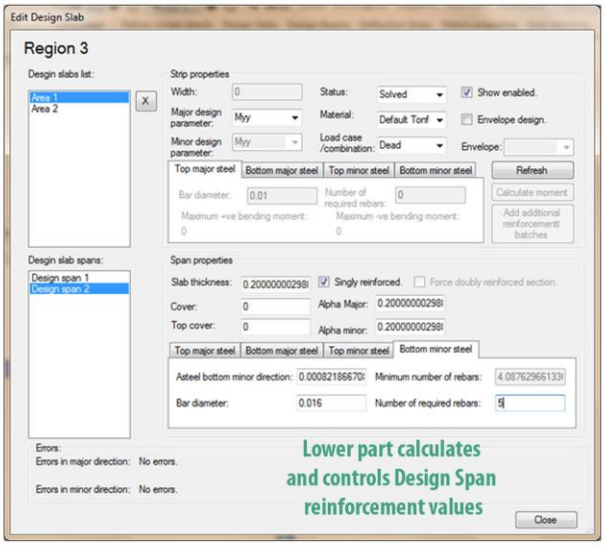
Bending moment diagram of the design strip




The strip consists of two design spans, top: positive moment part bottom: negative moment part

## 6) Reinforcement data for each span:

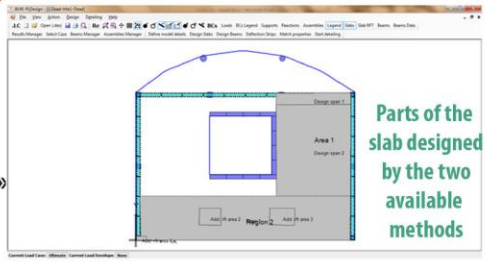
Each span is designed in terms of top and bottom steel reinforcement, while the package recommends the minimum number of steel area according to the design code chosen. The reinforcement data could then be exported to a detailed spreadsheet too.



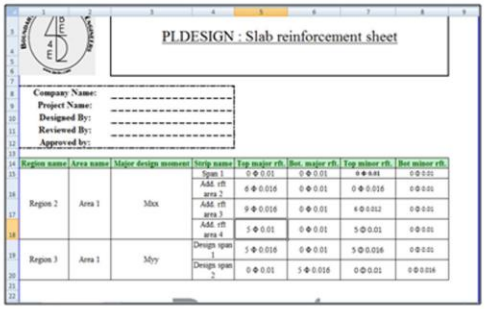

Lower part calculates and controls Design Span reinforcement values

## 7) Bulk data exporting:

Both types of slab design methods could be exported to one «Slab Reinforcement Sheet» as shown in the spreadsheet on the bottom right of the page. The sheet gives exact rebar value and quantity.



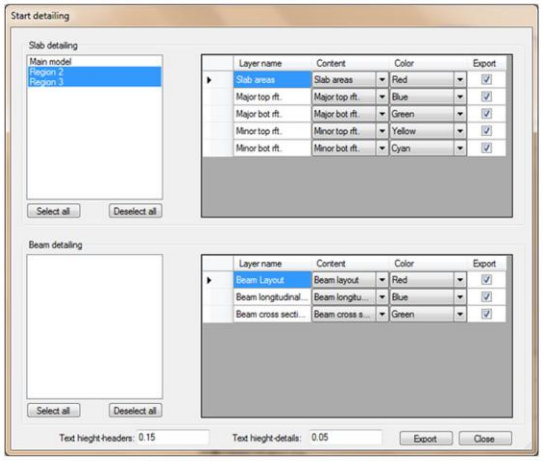

Parts of the slab designed by the two available methods



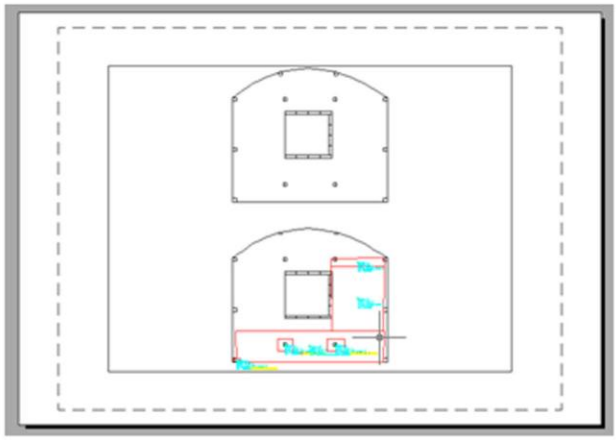

Bulk Reinforcement Details

## 8) Post-design (Detailing):

The user could now finalize the design with detailing the slab regions. Reinforcement directions and exact onsite appearance could be exported to CAD programs and to Revit Structure.



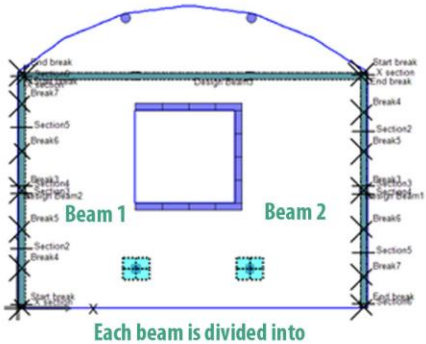

Slab and beam detailing window



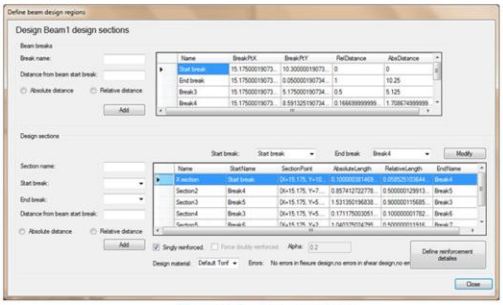
AutoCAD file showing reinforcement layout

## 9) Beam Design :

Beam design is done through a technique called «method of sections». The beam is analyzed at critical sections along its length (to be chosen by the user), and along with code steps and provisions each section is reinforced with normal rebar layers, longitudinal rebars and stirrups. The sections are then gathered together to represent the designed beam and exported automatically with full rebar details.




Each beam is divided into critical design sections of its own

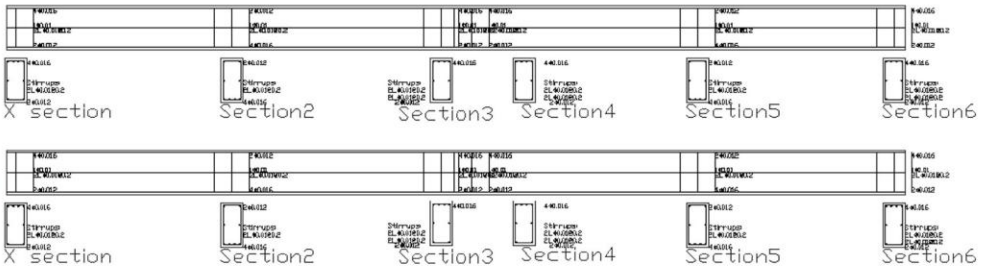



Beam design sections


Rebar and stirrups layout

Design Beam1

Beam detailing is automatically exported to AutoCAD with correct rebar layout and annotation without the need for further manual user-modifications




Design Beam2

## *In need of more questions answered?*

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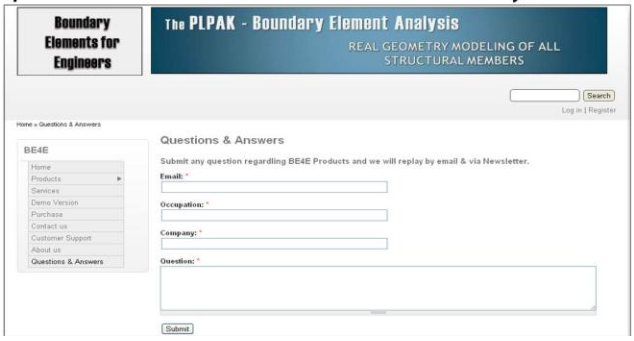


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