

## Patch Loading of FEA Plates in Staad Pro

### Notes for Using PatchStaad

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## Introduction

When using Staad Pro for the FEA of slabs and walls and having to apply pressure on part areas of the plate elements, Staad requires that area of the patch loading be specified relative to origin of the local plate axes. To this end, the user needs to calculate local coordinates of the two load corners i.e. top-left and bottom right.

Generally the global coordinates of the applied rectangular load and that of the plate elements on which this load acts are known. It is cumbersome to work out the coordinates required in the local coordinate system of the plate. In addition, at times the applied load may or may not act on the plate element and when it does, it may encompass full or only a part area of the plate.

Given the global coordinates of the load and the plate element, PatchStaad works out the local patch load coordinates. In addition it also produces code for data input into Staad. This code can be copied and pasted into the Staad input file.

## Method of Use & Data Store

The use of PatchStaad involves using two worksheet in conjunction with each other. The worksheet "Patch" is used for data input and viewing the relative size and location of the applied load and the plate element. The worksheet "Store" is used for storing data as well as data input on large scale using copy and paste facility of Excel.

The use of the two spreadsheets is self explanatory. Input data cells are shaded green. The data input is via changing contents of the green cells.

In the worksheet "Store", the patch loading data can be stored for as many elements as required, say over 30000 depending upon the file size. Two buttons in the header of worksheet "Store" allow the addition and deletion of data rows.

Starting from a minimum of 200 walls, data rows are added and or deleted in multiples of 10 and up to 1000 rows at a time. To add more than 1000 rows, the add row step can be repeated.

The worksheet "Patch" has buttons to allow retrieval of the stored data. Relevant buttons at the top of this worksheet can be clicked to store, retrieve, display-next or display-previous wall data. Click relevant buttons at top of the spreadsheet to store, retrieve, display-next or display-previous retaining wall data.

A data reference number starting from 1001 upwards is used for each wall data. This data can be recalled, amended and or re-stored later for any wall by the use of this reference number.

When familiarity has been gained, data in the worksheet "Store" can also be modified directly for ease

The worksheet "Store" includes columns which also show the applied load size, the plate element size, the size and magnitude of the patch load acting on the plate element.

## Units

PatchStaad works in consistent units.

In view of its universal use, these units are not stated anywhere in the input and output.

Hence, if the input units are kN and m, all output is based in kN and meter units.

## Load and plate Diagram

An interactive load and plate diagram is included in the "Patch" worksheet..

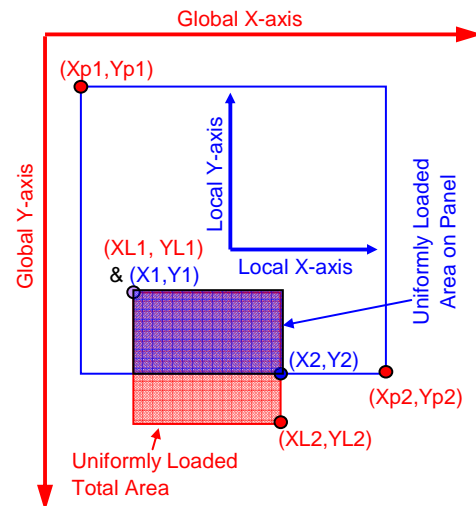
This diagram permits instant check of input data for the applied load and the plate element. It also enables comprehension of the area encompassed by the applied load acting on the plate element.

## Global & Local Coordinate Systems

A global coordinate system is used for describing the two corners of rectangular applied load and the Staad plate. This coordinate system has its X-axis positive to the right and Y-axis positive downwards.

The local coordinate system, which is used for applying patch loads in Staad, has its origin at centroid of the Staad rectangular plate element. Its X-axis is positive to the right and Y-axis is positive upwards.

Both coordinate systems are shown in a static sketch included in the worksheet "Patch". This diagram is reproduced here. It shows the patch load in violet colour, applied load in red and the Staad plate in blue.



## Limitation

The applied load can only be rectangular having a uniform pressure.

Plate elements can only be rectangular.