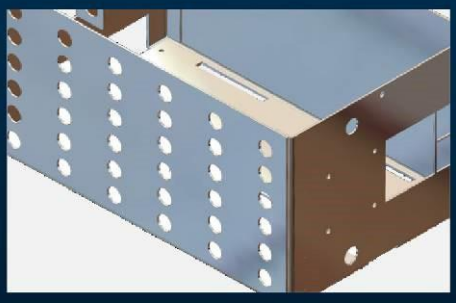
DFMPro
A Geometric Product

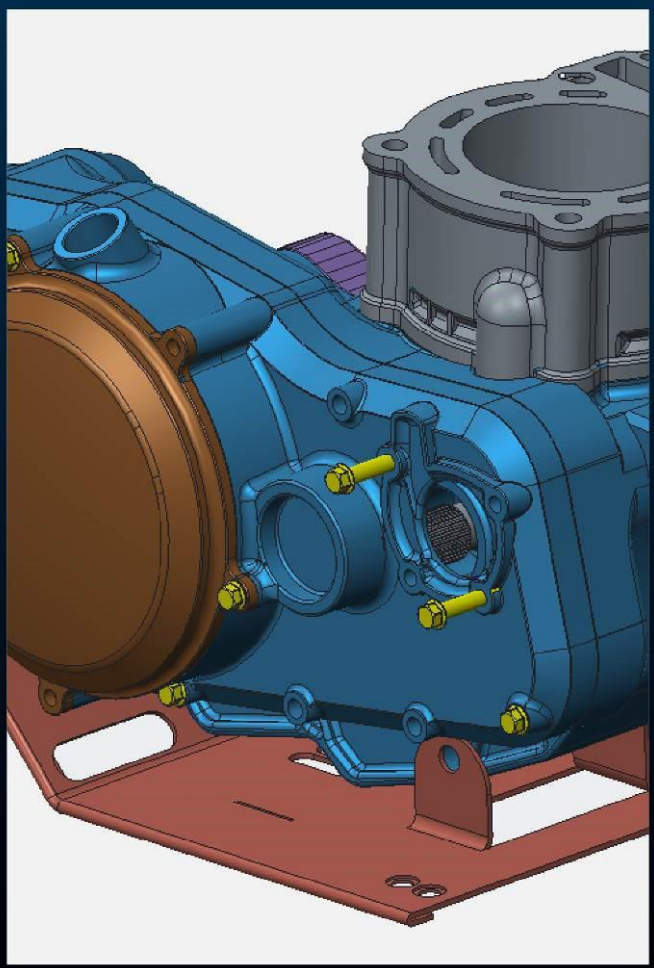


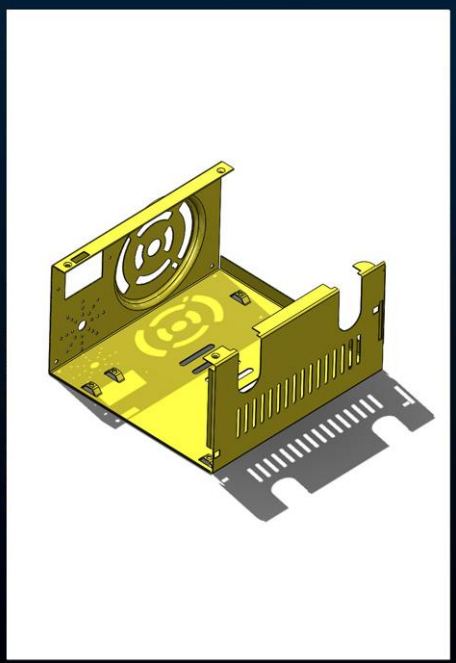
A DEFINITIVE GUIDE TO

DESIGN FOR MANUFACTURING SUCCESS











DFMPro
A Geometric Product

Sheet Metal Design Guidelines

Issue XVI, Dec 2015

Copyright Notice

© Geometric Limited. All rights reserved.

No part of this document (whether in hardcopy or electronic form) may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, to any third party without the written permission of Geometric Limited. Geometric Limited reserves the right to change the information contained in this document without prior notice.

The names or trademarks or registered trademarks used in this document are the sole property of the respective owners and are governed/ protected by the relevant trademark and copyright laws.

This document is provided by Geometric Limited for informational purposes only, without representation or warranty of any kind, and Geometric Limited shall not be liable for errors or omissions with respect to the document. The information contained herein is provided on an "AS-IS" basis and to the maximum extent permitted by applicable law, Geometric Limited hereby disclaims all other warranties and conditions, either express, implied or statutory, including but not limited to, any (if any) implied warranties, duties or conditions of merchantability, of fitness for a particular purpose, of accuracy or completeness of responses, of results, of workmanlike effort, of lack of viruses, and of lack of negligence, all with regard to the document.

THERE IS NO WARRANTY OR CONDITION OF NON-INFRINGEMENT OF ANY INTELLECTUAL PROPERTY RIGHTS WITH REGARD TO THE DOCUMENT. IN NO EVENT WILL GEOMETRIC LIMITED BE LIABLE TO ANY OTHER PARTY FOR LOST PROFITS, LOSS OF USE, LOSS OF DATA, OR ANY INCIDENTAL, CONSEQUENTIAL, DIRECT, INDIRECT, OR SPECIAL DAMAGES WHETHER UNDER CONTRACT, TORT, WARRANTY, OR OTHERWISE, ARISING IN ANY WAY OUT OF THIS DOCUMENT, WHETHER OR NOT SUCH PARTY HAD ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

Continuing our focus on sheet metal forming, this issue of DFM guidebook focuses on design guidelines for bend relief parameters, distance between holes and bends and offset bend parameters.

If you design sheet metal parts, you may know that bend relief is a notch cut made into the material when a bend is made close to an edge. Bend relief prevents the sheet metal to distort or tear when it makes a transition from flat surface to a bend

Here are some of the guidelines you can read in this issue:

- Bend Relief Parameters
- Spacing between holes in Perforated Metal
- Hole to Bend Distance in Perforated Metal
- Offset Bend Parameters
- Distance between Offset Bends and Extruded Hole

If you have any feedback or questions on DFM guidebook, please write to us at info@dfmpro.com

Rahul Rajadhyaksha

Senior Product Manager

Geometric Limited

Contents

Bend Relief Parameters 6

Spacing Between Holes in Perforated Metal 7

Hole to Bend Distance in Perforated Metal 8

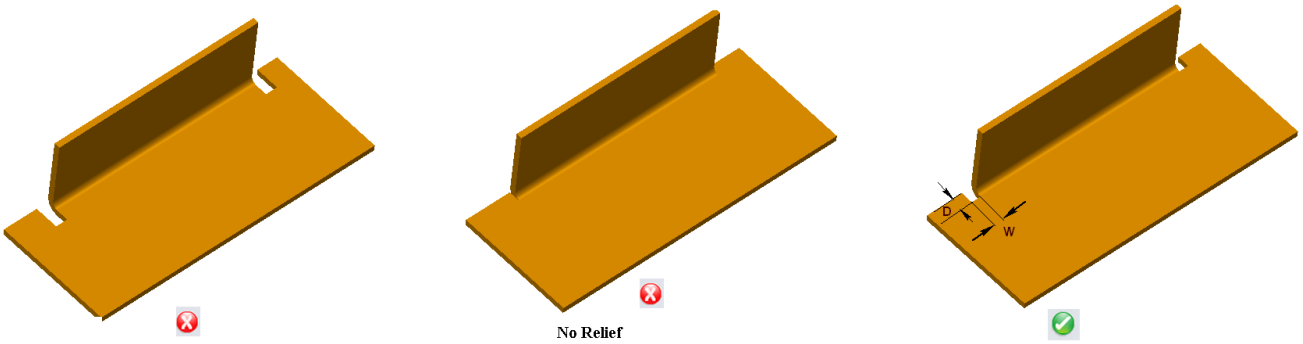
Offset Bend Parameters 9

Distance between Offset Bends and Extruded hole 10

Bend Relief Parameters

When a bend is made close to an edge, the sheet metal may tear unless bend relief is given. Bend relief helps in controlling the sheet metal material behavior and prevents unwanted deformation when a bend does not extend the entire length of a part, or a form is close to other sheet metal features.

It is recommended to use rectangular relief. The minimum depth (D) of a bend relief should be equal to the material thickness plus the radius of a bend. The minimum width (W) of a bend relief should be equal to 1.5 times the material thickness

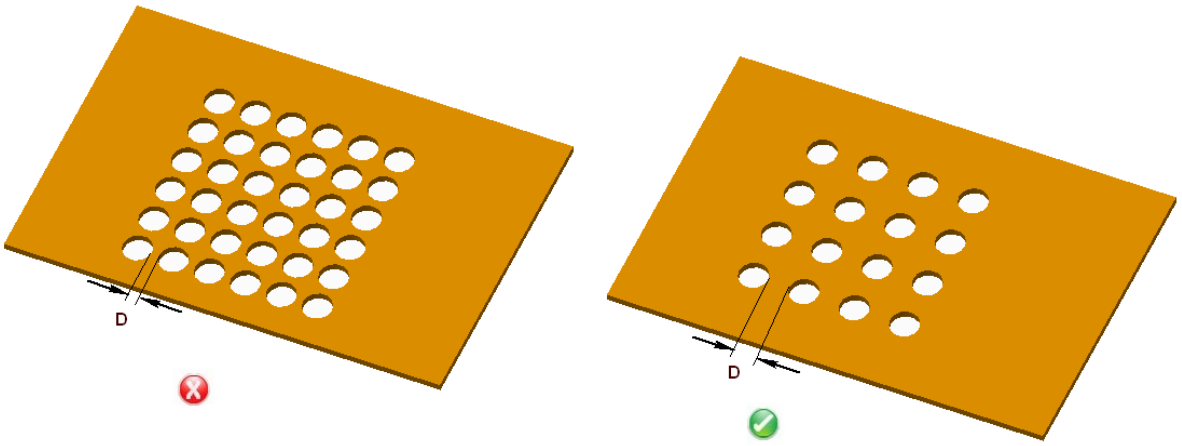


D = Depth of Bend Relief
W = Width of Bend Relief

Spacing Between Holes in Perforated Metal

Perforated metal is nothing but a pattern of holes on a sheet metal surface. It has endless applications in enclosures, partitions, sign panels, guards and screens as it offer several benefits like larger open areas, higher strength-to-weight ratio, good aesthetic appeal and different hole sizes.

It is recommended that minimum distance between the holes in a perforated metal should be equal to 1.2 times the material thickness.



D = Distance between holes

Hole to Bend Distance in Perforated Metal

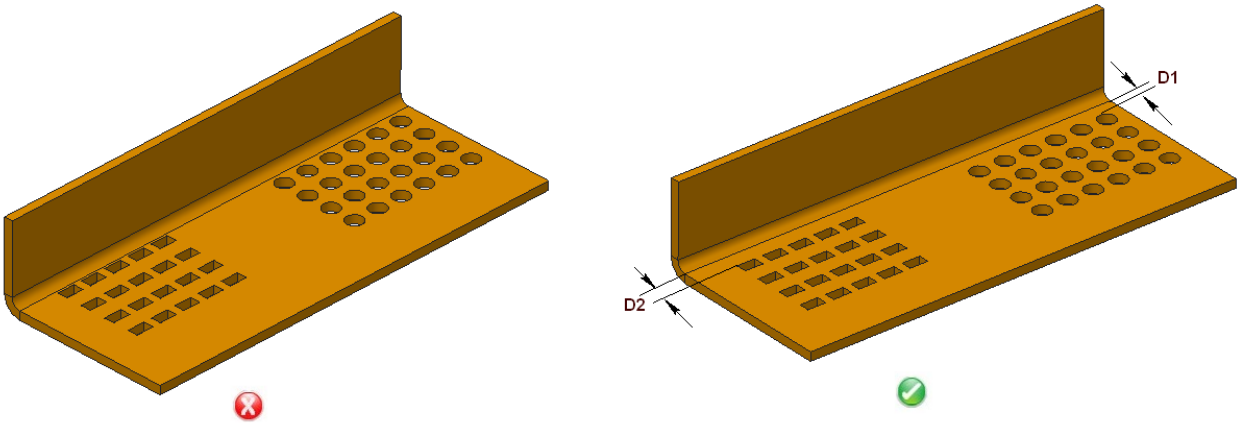
When a bend is made too close to the hole, the hole may become deformed. The minimum distance recommended for circular holes and rectangular holes is as following

For Circular Holes:

It is recommended that the minimum distance from the edge of a circular hole to a bend should be 3 times the material thickness

For Rectangular Holes:

It is recommended that the minimum distance from the edge of a rectangular hole to a bend should be 3.5 times the material thickness.



D1 = Distance Between Hole and Bend

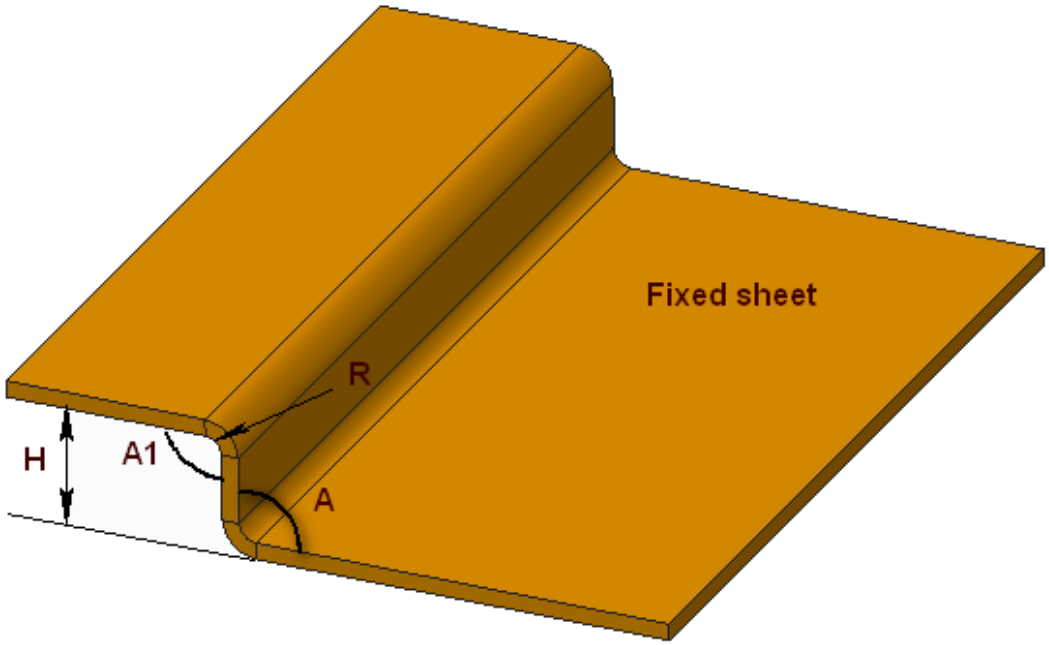
D2 = Distance Between Rectangular Holes and Bend

Offset Bend Parameters

An offset bend, also called as joggle is made up of two very short bends formed simultaneously. It is used to joggle other sheet metal surface or overlap of a sheet.

It is recommended that:

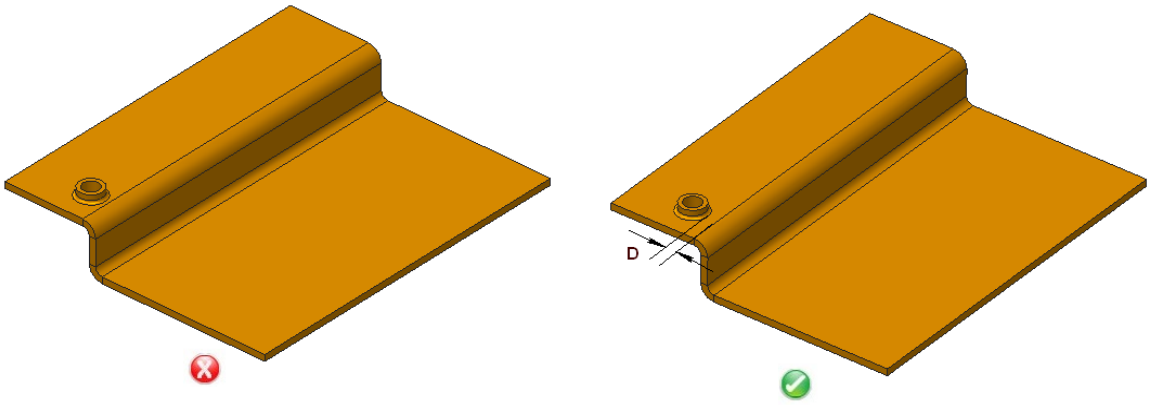
- The bends angles (A1) should be obtuse angles or right angles.
- The maximum height (H) of an offset bend should be five times of the material thickness.



H = Offset Height
R = Bend Radius
A1 = Offset Bend Angle

Distance between Offset Bends and Extruded hole

The minimum recommended distance from the bend's inside surface to the major diameter of extrusion should be equal to 2.5 times the material thickness.



D1 = Distance between offset Bend to extruded Hole