

Products – Impact extruded products

Table of contents

5 Impact extruded products	2
5.1 Basic characteristics of impact extruded products (IEP).....	2
5.2 Recommended alloys and typical properties	3
5.3 Gauge, tolerances and about the process	4
5.4 Additional forming and product applications	5
5.5 Typical shapes	6

5 Impact extruded products

5.1 Basic characteristics of impact extruded products (IEP)

Literature:

- ⤴ Tschätsch, H.: Handbuch der Umformtechnik. Hoppenstädt Technik Tabellen Verlag, 1987
- ⤴ Mayrhofer, K.: Kaltfließpressen von Stahl und Nichteisenmetallen. Berlin, Heidelberg: Springer-Verlag, 1983
- ⤴ Lange, K.: Lehrbuch der Umformtechnik. Bd. 1 - 3. Berlin, Heidelberg: Springer-Verlag, 1975
- ⤴ Lange, K. (Hrg.), Handbuch der Umformtechnik. Bd. 1 bis 3. 2. Aufl., Berlin, Heidelberg, New York, Tokyo: Springer-Verlag 1984 bis 1990
- ⤴ Ostermann, F., Anwendungstechnologie Aluminium, Berlin, Heidelberg, London, New York, Tokyo: Springer-Verlag, 1998, ISBN 3-540-62706-5
- ⤴ Skog S., Asbøll, K.: An Upper Casing for an Automobile Steering Column. TALAT Lecture 2101.01. 1992
- ⤴ Siegert, K. and Kammerer, M.: Impact Extrusion. TALAT Lecture Series No. 3500, 1996 Siegert, K.(ed.): Fließpressen von Aluminium. Bd. 1. Symposium "Gestalten und Fertigen von technischen Fließpreßteilen aus Aluminium". Oberursel: DGM Informationsgesellschaft, 1995. ISBN 3-88355-215-1

Scope

The intention of this chapter is to give ideas about impact extruded aluminium products in automotive application.

The products may differ considerably from similar steel products due to aluminium's excellent formability.

Economy / Quality

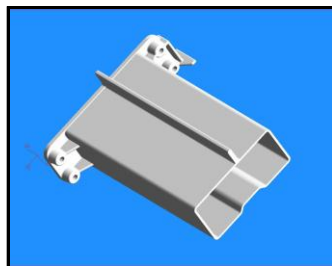
Impact extrusion (IE) can in several cases replace an assembly of multicomponents. E.g. instead of welding a sheet to the end of an extrusion, a component can be made in one piece by IE.

In general, an IE part will cost more per weight than an extrusion, but when assembly cost is included, a smart IE design will compete on price.

Fewer assembly joints will reduce number and intensity of stress raisers and thus reduce risk for failure.

Example:

An impact extruded part with integrated end plate. Note details in end plate.



Source: Hydro Aluminium

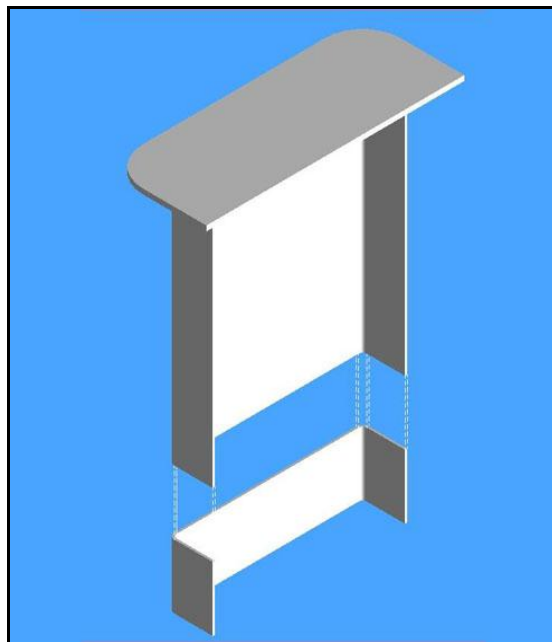
5.2 Recommended alloys and typical properties

Generally, all wrought aluminium alloys can be impact extruded. The limits are determined by press force, tool design and formability with respect to part design.

Alloy 1050A and 3103 are non heat treatable and have low ductility due to the work hardening. The others, the heat treatable alloys, exhibit higher elongation because heat treatment removes the work hardening. Recommended alloys and typical property data of impact extruded products are listed below:

Alloy	Temper	Tensile Properties		Elongation
		Rm (MPa)	Rp0.2 (Mpa)	A5 %
1050A	F	130	110	6
2014	T4	430	290	20
	T6	480	410	11
3103	F	200	185	4
6060/6063	T6	245	195	15
6082	T6	340	300	13
7108	T6	400	360	13

Properties of interest beside tensile are: formability, corrosion resistance and crashworthiness.



An impact extruded profile with end boss can be extruded to different lengths (half section view)

5.3 Gauge, tolerances and about the process

Dimensions

In reality, it is the manufacturing equipment only that sets the limitations on max width and length.

Tolerances are related to cost; closer than standard tolerances require additional operations. Normal tolerances on profiles will be about 1/3 that of standard extrusions. Close tolerances on straightness will require straightening operations.

About the process

Impact extrusion can be run with cold, warm or hot material. Formability increases with increasing temperature.

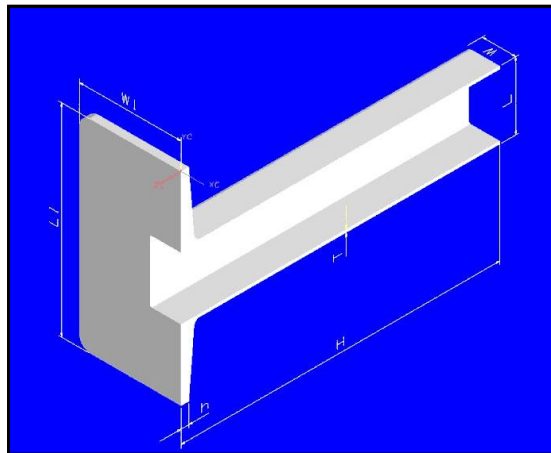
Cold IE needs several processing steps when high reduction ratios are required.

Surface becomes softer when extruded cold. Long extrusions need hot process or cold ironing.

Lubrication for cold forming is an "advanced" chemical process which requires a process line in itself.

Examples:

Hollow rectangular profile with flange. Note: Important gauges are indicated.



Hollow rectangular profile with flange

5.4 Additional forming and product applications

Bending and cross sectional reforming

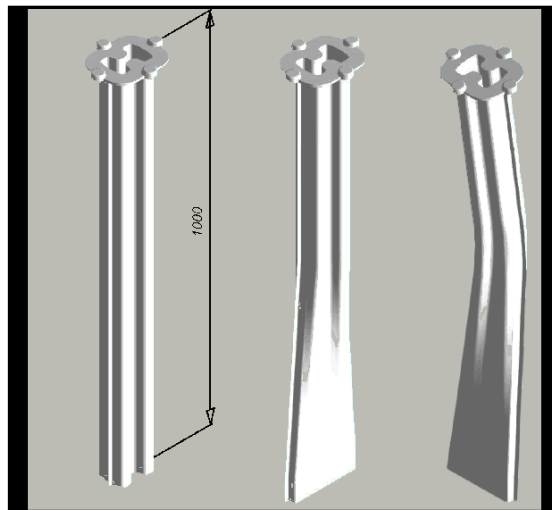
Longer IE products can be bent and subjected to reshaping like changing cross section geometry locally.

Changes in cross section can be done by hydroforming or by mechanical compression or expansion.

Product applications

Products which could be considered are extrusions of type which needs flanges including details on the flange. Especially when these products are dynamically loaded, such joints are superior to welded joints.

Crash boxes, front end parts, A-post and **B-post** are examples to be considered.

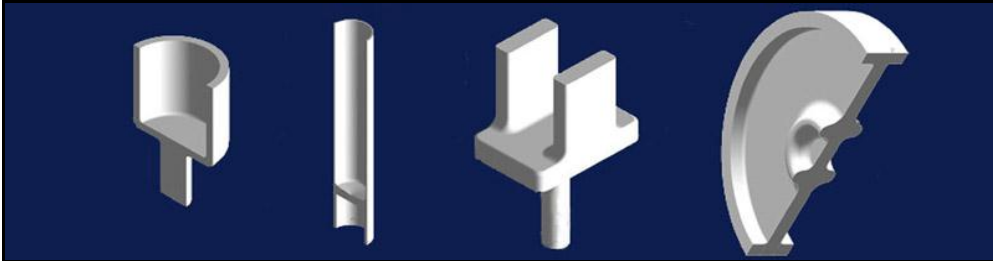


Example of an IE product which is compressed and expanded transversally and 1-axially bent

5.5 Typical shapes

An assembly of various shapes that can be formed by impact extrusion.

- (a) Cup w/ pin (b) Tube w/ bottom (c) U-joint w/ pin (d) Disk w/ rim and centre



An assembly of various shapes that can be formed by impact extrusion