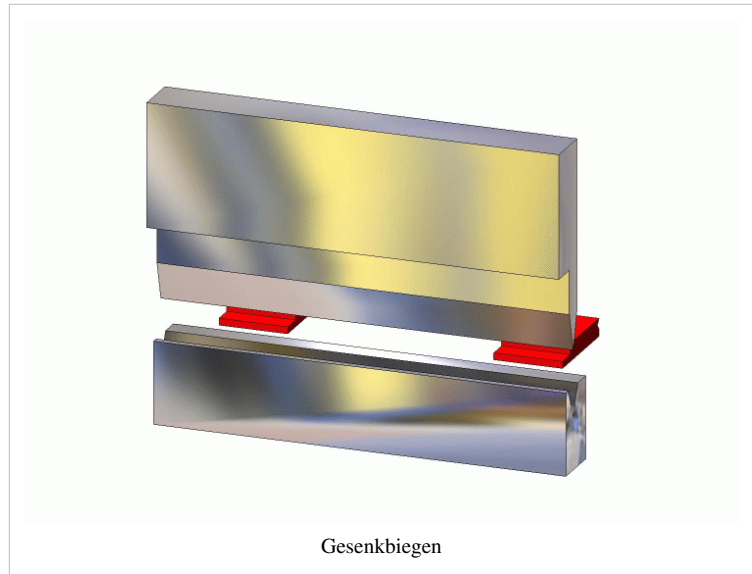


# Gesenkbiegen

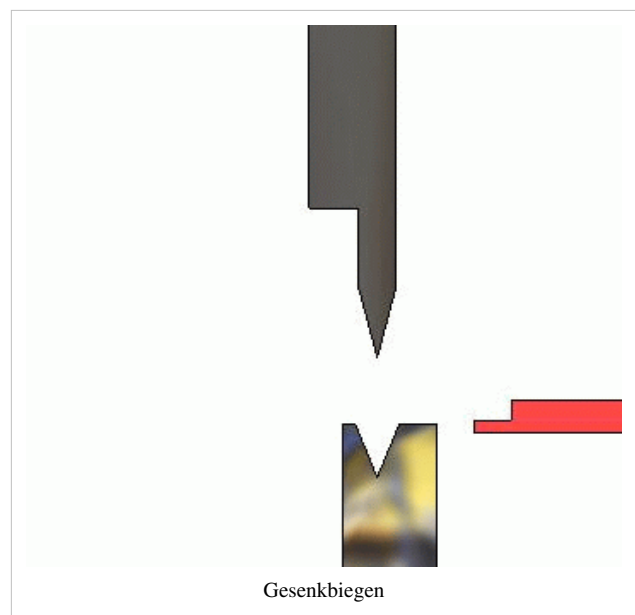
Beim **Gesenkbiegen** (vielfach auch als **Abkanten** bezeichnet) wird das un- oder vorgebogene Werkstück (das Blechteil) auf eine Matrize mit V-förmiger Öffnung gelegt. Die dargestellten Hinteranschlüge ermöglichen es, das Werkstück schnell und wiederholbar genau auf der Matrize zu positionieren. Bei modernen CNC-Maschinen werden zwei computergesteuerte Hinteranschlüge verwendet. Durch die kontrollierte Abwärtsbewegung des Oberwerkzeugs, welches als Stempel oder auch Schwert bezeichnet wird, findet die Blechumformung statt.



## Freies Biegen, Prägebiegen und Dreipunktbiegen

Man unterscheidet zwischen *Freiem Biegen* (auch: *Luftbiegen*, *Freibiegen*, *freies Biegen im Gesenk*), *Prägebiegen* und *Dreipunktbiegen*.

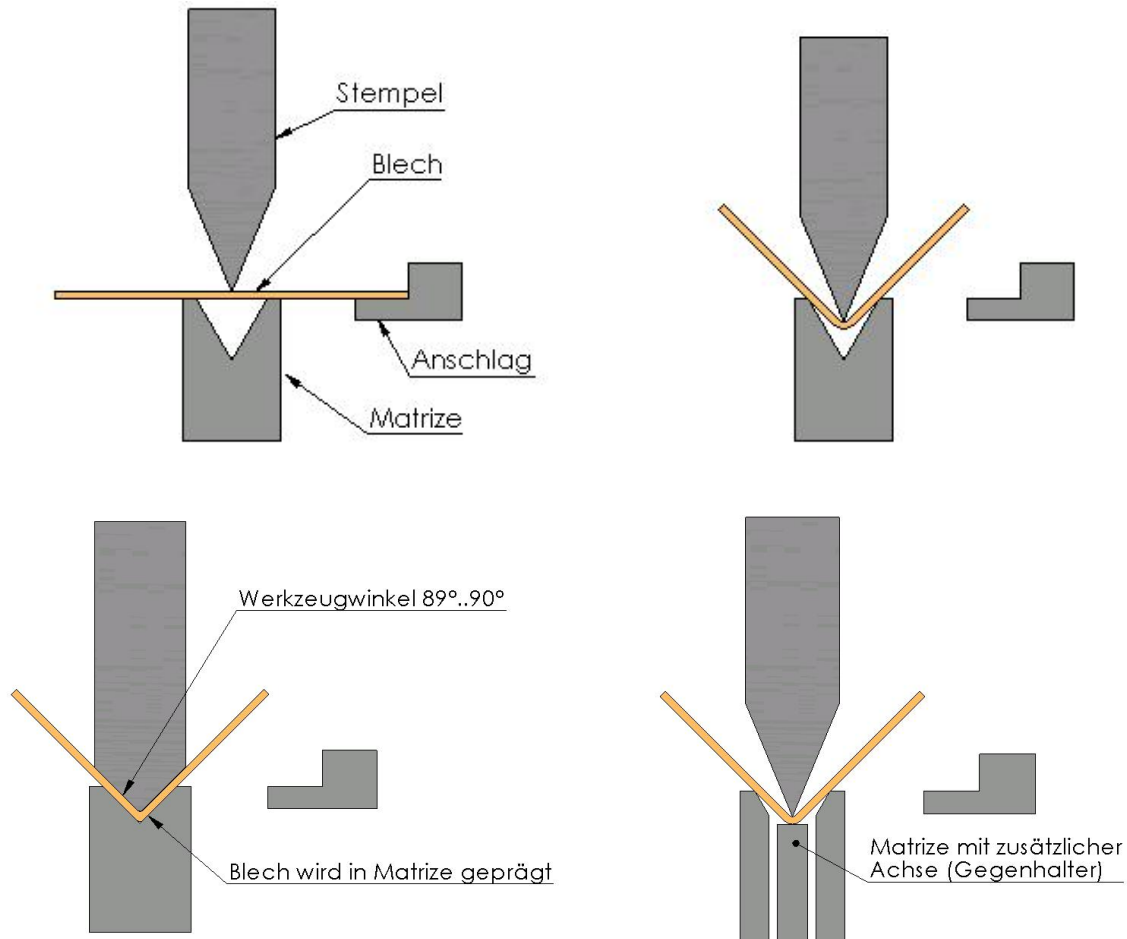
Als *Freies Biegen* bezeichnet man das in Bild a) und b) dargestellte Verfahren. Charakteristisch hierfür ist, dass das bearbeitete Blech die Matrize nur an den beiden Kanten berührt. Zum Fertigen von Biegungen mit ausreichender Genauigkeit ist eine präzise Steuerung des Stempels erforderlich, wofür eine CNC-Maschine eingesetzt wird. Vorteilhaft am Freibiegen ist insbesondere die Möglichkeit, unterschiedliche Winkel ohne Werkzeugwechsel zu fertigen. Aus diesem Grund wird es häufiger angewandt als das Prägebiegen oder Dreipunktbiegen (siehe unten). Der entstehende Radius an der Biegekante wird im Wesentlichen von der Öffnungsweite der Matrize („V-Öffnung“) bestimmt. Der Radius an der Unterkante des Stempels hat kaum Einfluss auf den Radius.



Beim *Prägebiegen* wird das Blech zwischen Stempel und Matrize mit hohem Druck geprägt. Die Öffnungswinkel von Stempel und Matrize sind nahe bei  $90^\circ$ . Das Prägebiegen liefert etwas genauere Ergebnisse, verlangt eine nicht so hohe Genauigkeit der Steuerung ist aber weniger flexibel, da der Werkzeugsatz genau für einen Biegewinkel ausgelegt ist.

Beim *Dreipunktbiegen* drückt der Stempel das Werkstück bis auf die Matrize („U-Öffnung“), so dass das Werkstück die Matrize an drei Punkten berührt. Das Biegeergebnis ist präziser als beim freien Biegen, der Öffnungswinkel wird durch die Position der drei Werkstückauflagepunkte (genauer: drei Auflagelinien, je eine an jeder oberen Innenkante

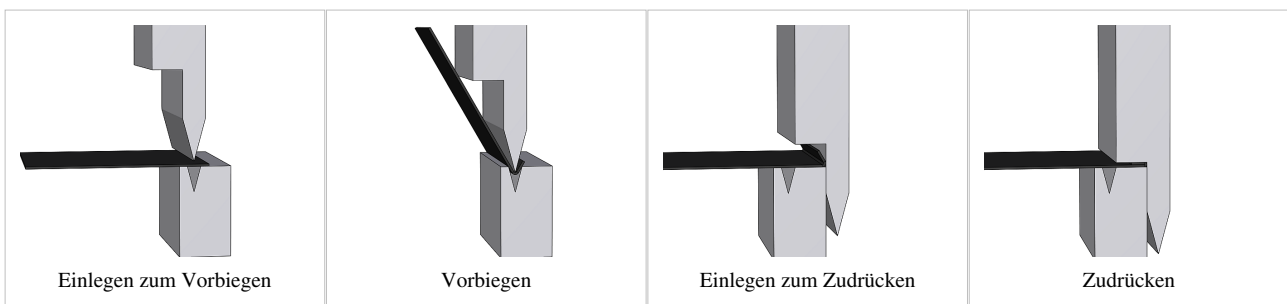
der Matrize und eine auf dem als Gegenhalter fungierenden Matrizenboden) bestimmt. Ist die Matrize mit einem in der Höhe verfahrbaren Gegenhalter ausgestattet, lassen sich auch unterschiedliche Biegewinkel ohne Werkzeugwechsel herstellen. Allerdings ist die Steuerung durch diese zusätzliche gesteuerte Achse (das heißt, durch den beweglichen Gegenhalter) und die Notwendigkeit, den unteren Endpunkt des Stempels genau auf die Position des beweglichen Gegenhalters abzustimmen, aufwendiger. Außerdem sind die Werkzeuge teurer. Nur wenige Maschinenhersteller produzieren Biegemaschinen für dieses Verfahren.



### Biegen eines Umschlags

Das Biegen eines Umschlags, auch Falz oder Dopplung genannt, erfolgt in zwei Schritten:

1. Das *Vorbiegen* erfolgt, wie oben beschrieben, als freies Biegen im Gesenk.
2. Vor dem Einlegen des Blechs wird die Matrize nach vorne verfahren. Hierzu bieten moderne Biegemaschinen eine eigene, numerisch gesteuerte Achse. Der Stempel wird heruntergefahren und dient als Hinteranschlag (3. Bild). Anschließend wird zugedrückt.



**Siehe auch**

- Blechabwicklung
  - Schwenkbiegen
  - Biegeverkürzung
  - Laserstrahlbiegen
  - Gesenkbiegepresse
  - Abkantwerkzeug
-

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