NETFORM

mühendislik • makina • metal

Sayısal Simülasyon Destekli Kaynak ve Mekanik Birleştirme Proses Tasarımı

BİAS Kullanıcılar Konferansı / 03-04 Ekim 2019 / İstanbul

İçerik

- NETFORM
- Bilgisayar destekli mühendislik nedir?
- Birleştirme yöntemleri
  - Termal birleştirme (kaynak)
  - Mekanik birleştirme
- Örnek simülasyon çalışmaları

NETFORM

Faaliyet alanı: İmalat teknolojileri

- Metal şekillendirme
  - Soğuk /ılık / sıcak dövme
  - Sac şekillendirme
  - Roll form
- Kaynak
- Mekanik birleştirme
- Eklemeli imalat
- Optik kontrol sistemleri

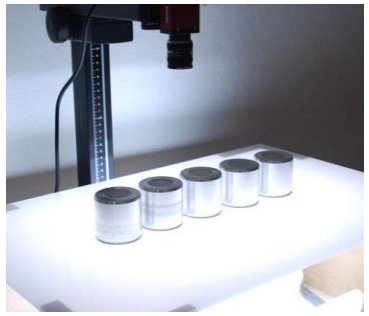
Kuruluş yılı: 2010

Yer: İzmir

NETFORM

mühendislik • makina • metal

Ürünler



Yazılımlar

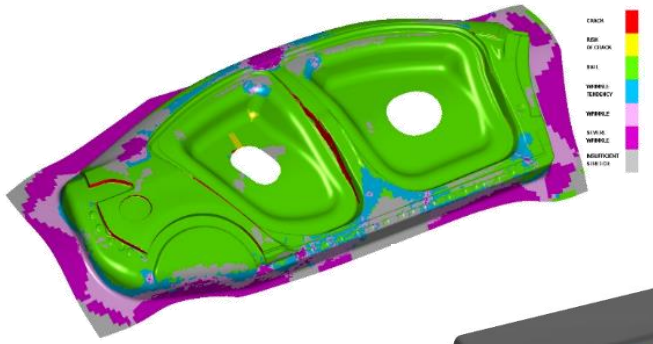
simufact forming
Forming Simulation

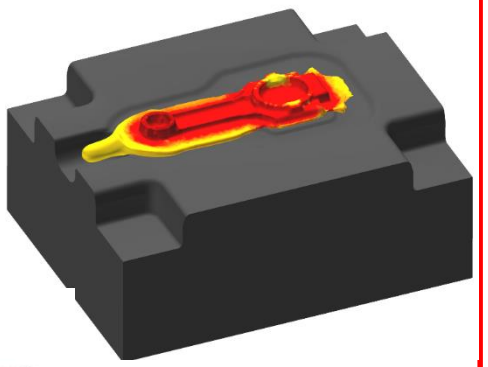
simufact welding
Welding Simulation

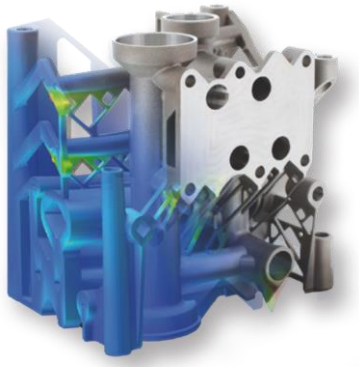
simufact additive
Additive Manufacturing Simulation

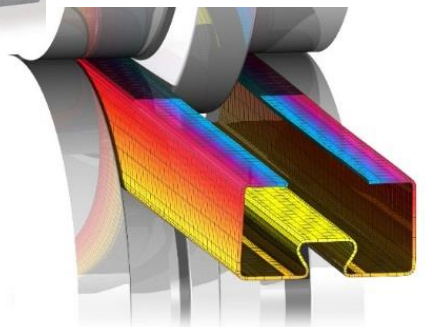
DYNAFORM eta/

COPRA® RF



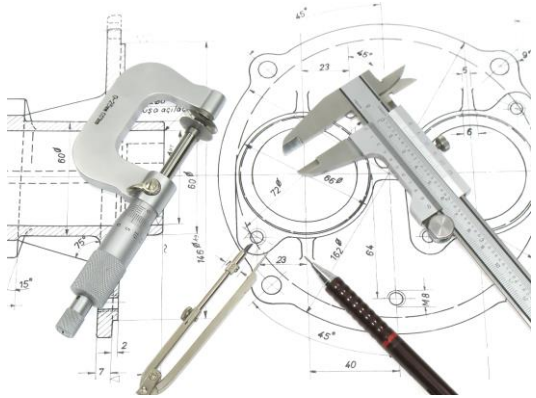






Eğitimler

Hizmetler

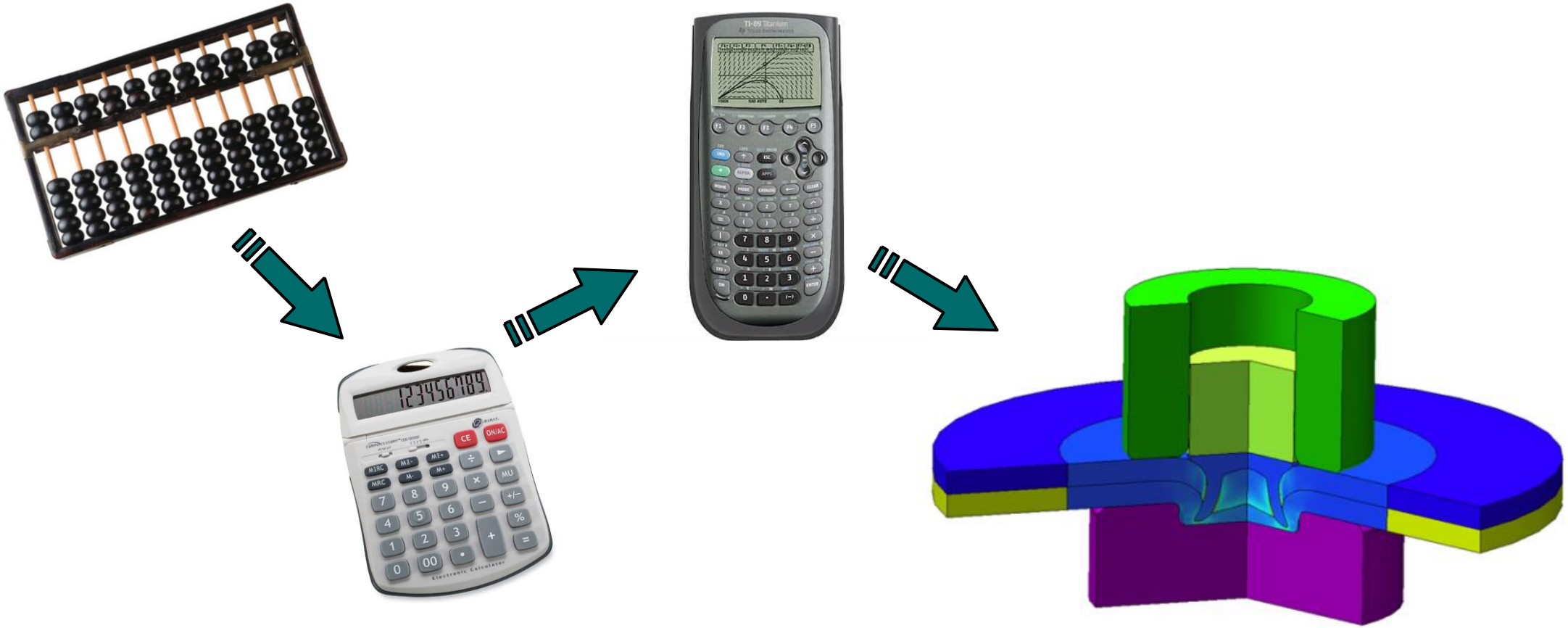


Mühendislik;

matematik ile birlikte bilimsel-ekonomik-sosyal-pratik bilginin, yapılar, makinalar, araçlar, sistemler, parçalar, malzemeler, prosesler, çözümler ve organizasyonlara yönelik buluş, yenilik, tasarım, bakım, yapım, araştırma ve geliştirme için kullanılmasıdır.

WIKIPEDIA
The Free Encyclopedia

Bilgisayar Destekli Mühendislik



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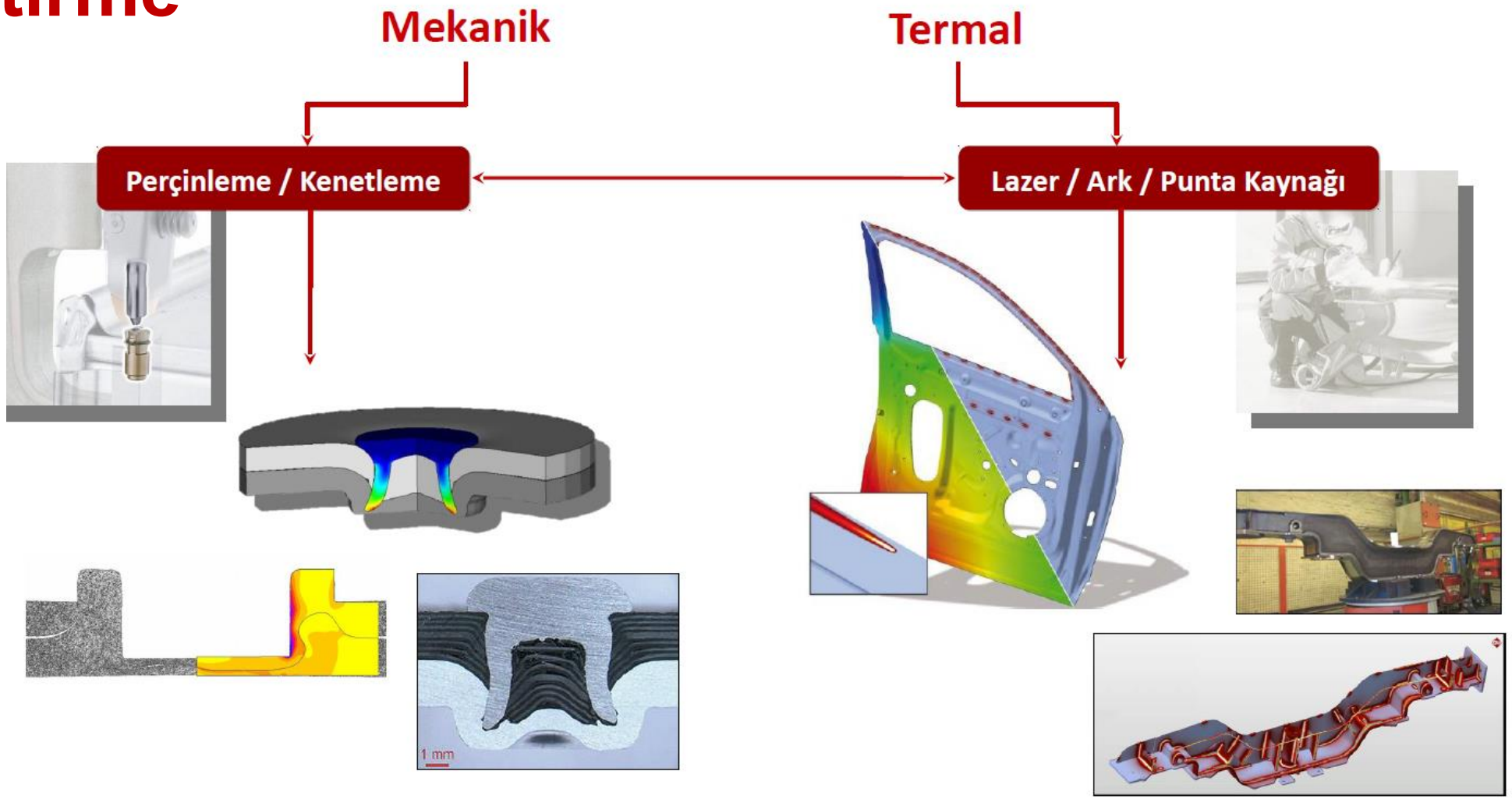
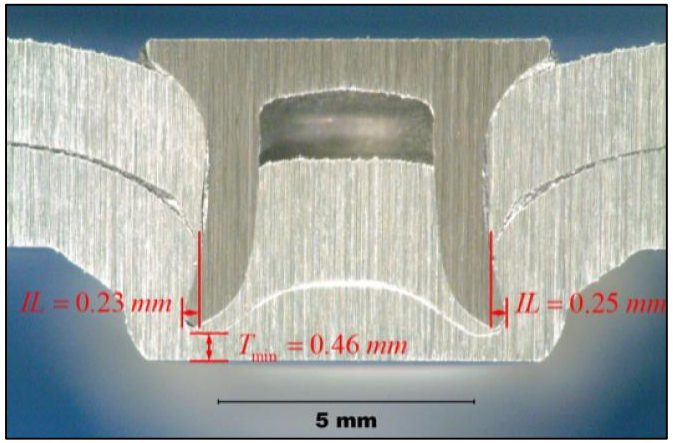
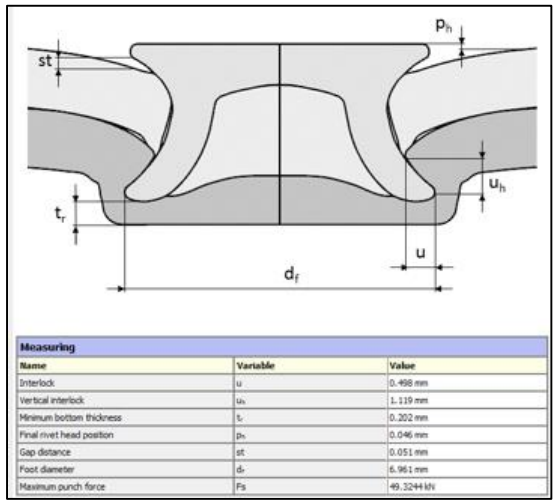
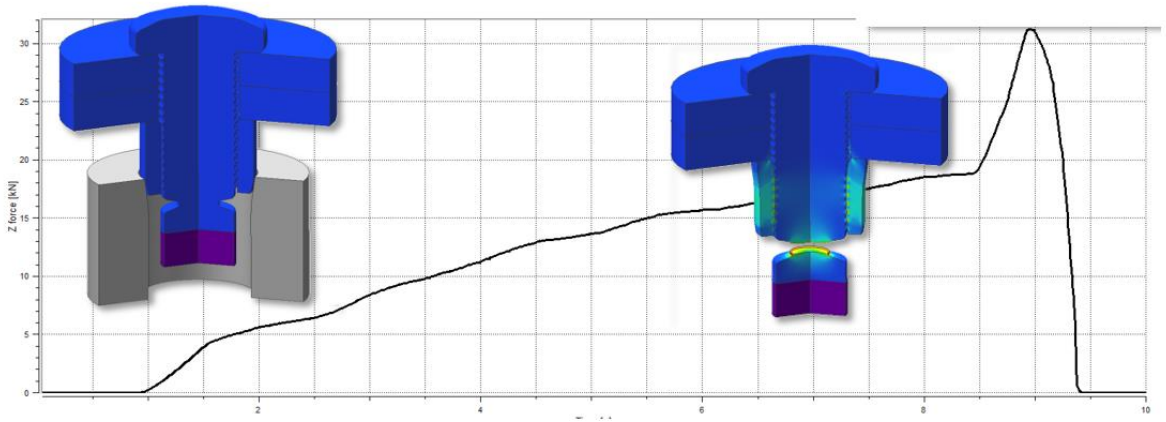


Mekanik Birleştirme

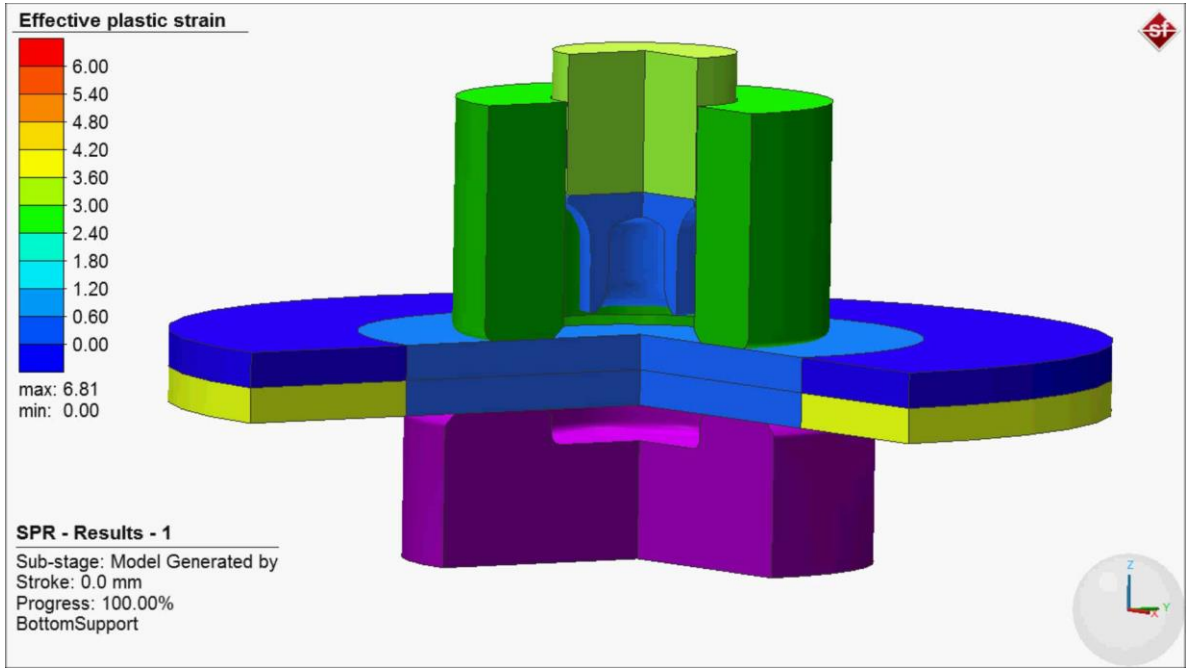


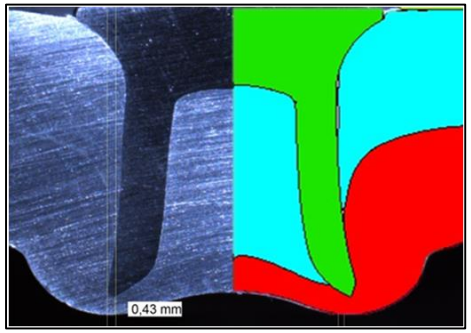


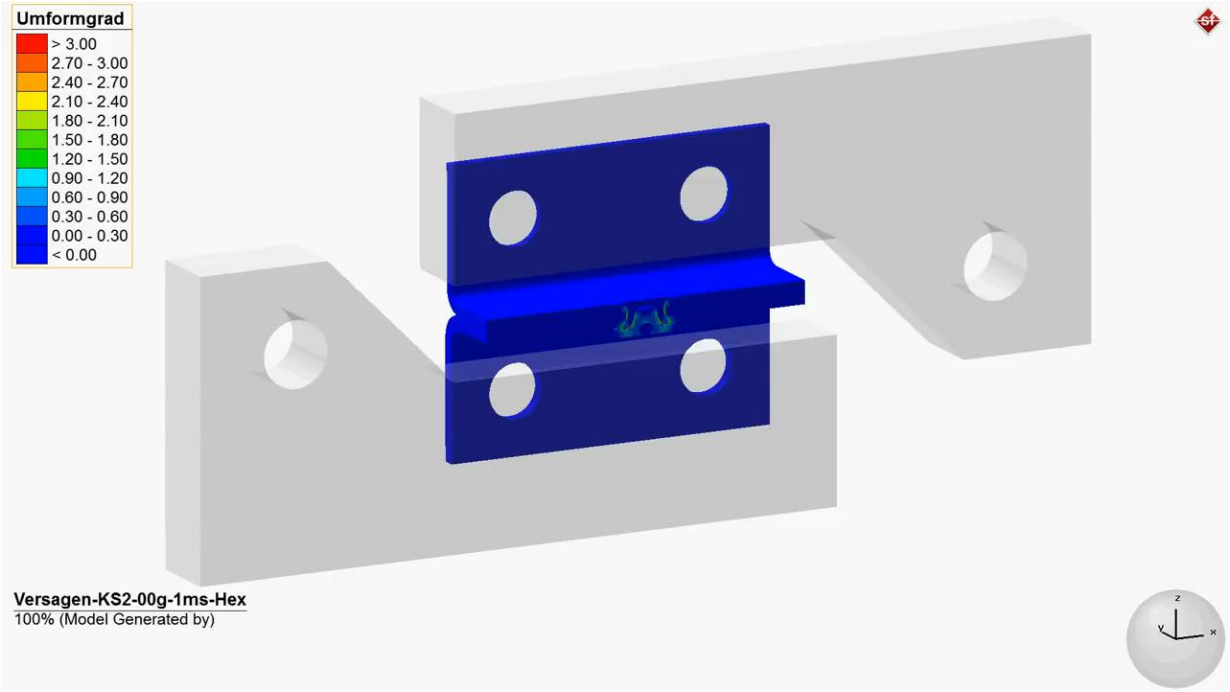


- Bağlantı elemanı üzerindeki gerilmeler
- Birleştirme kuvveti
- Çıkarma kuvveti
- Birleştirme sonrası birleştirilen parçalar üzerindeki gerilmeler
- Birleştirilen parçalar üzerindeki form değişiklikleri ve incelmeler

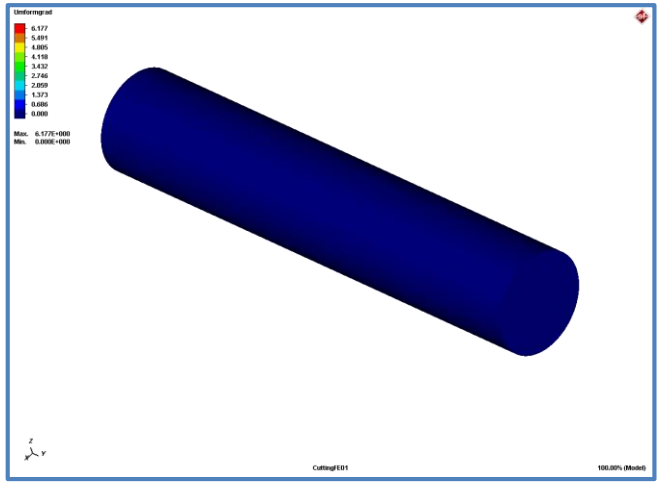
Perçinleme

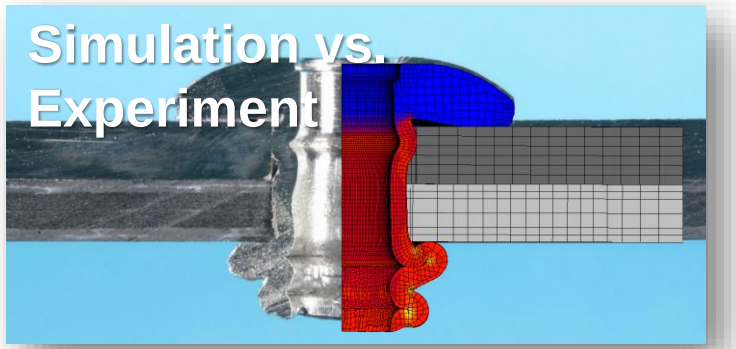

Effective plastic strain
6.00
5.40
4.80
4.20
3.60
3.00
2.40
1.80
1.20
0.60
0.00
max: 6.81
min: 0.00
SPR - Results - 1
Sub-stage: Model Generated by
Stroke: 0.0 mm
Progress: 100.00%
BottomSupport

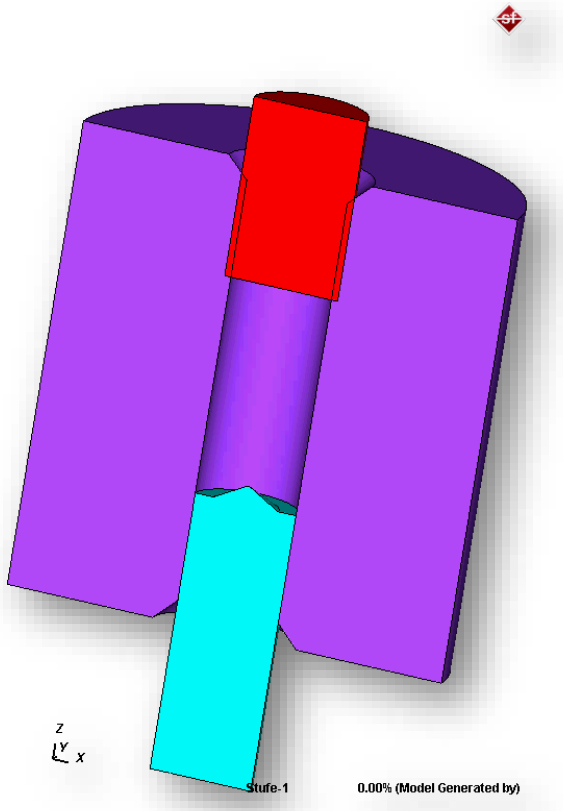

0,43 mm

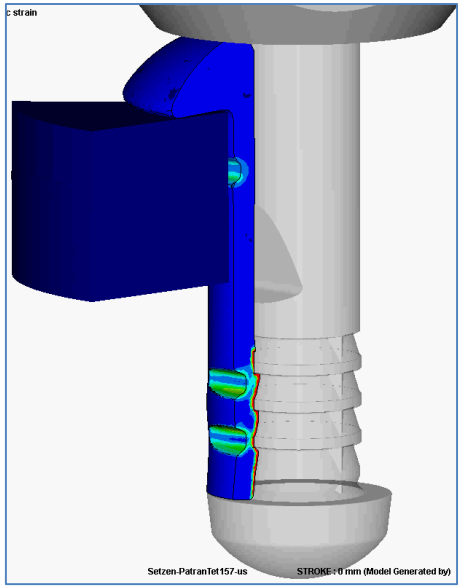

Umformgrad
> 3.00
2.70 - 3.00
2.40 - 2.70
2.10 - 2.40
1.80 - 2.10
1.50 - 1.80
1.20 - 1.50
0.90 - 1.20
0.60 - 0.90
0.30 - 0.60
0.00 - 0.30
< 0.00
Versagen-KS2-00g-1ms-Hex
100% (Model Generated by)

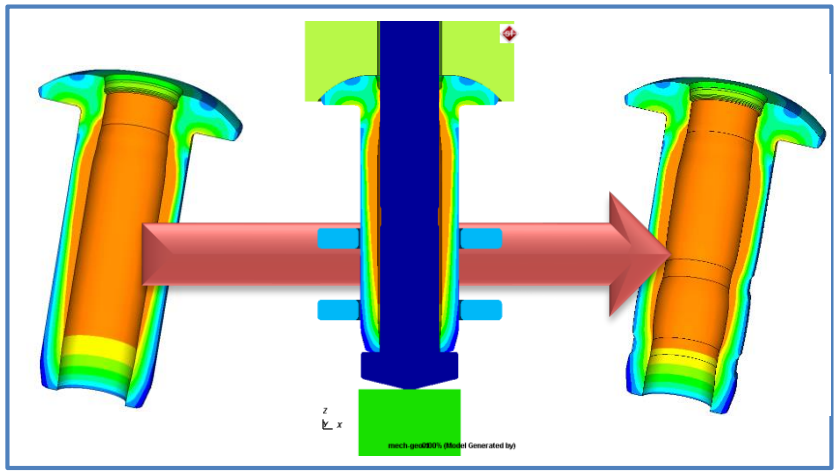
Perçinleme



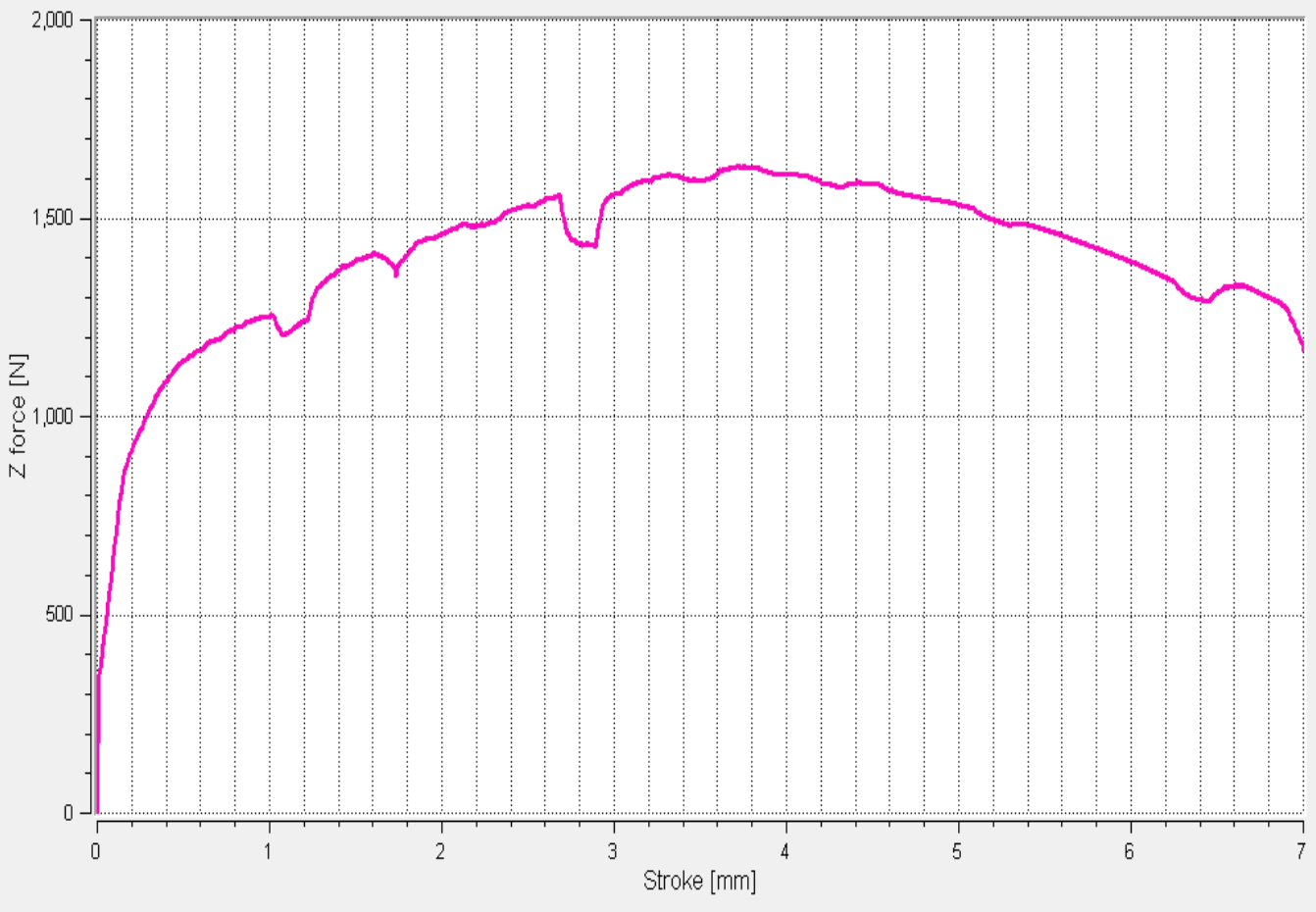

Simulation vs.
Experiment

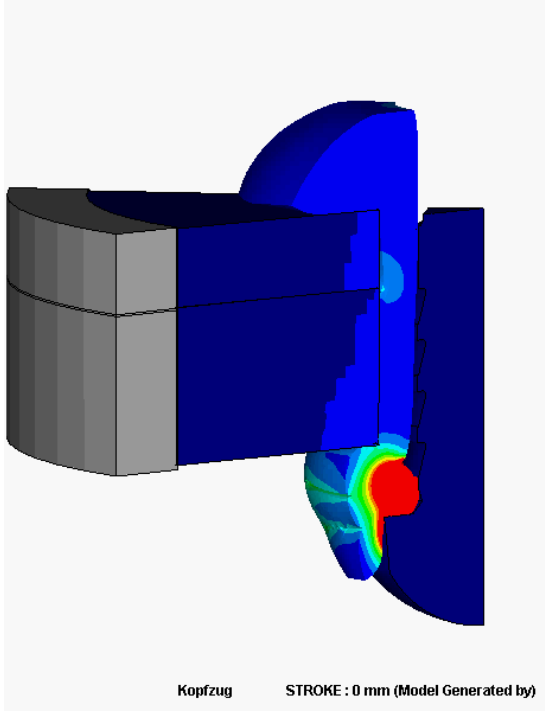

Stufe-1
0.00% (Model Generated by)


Setzen-PatranTet157-us



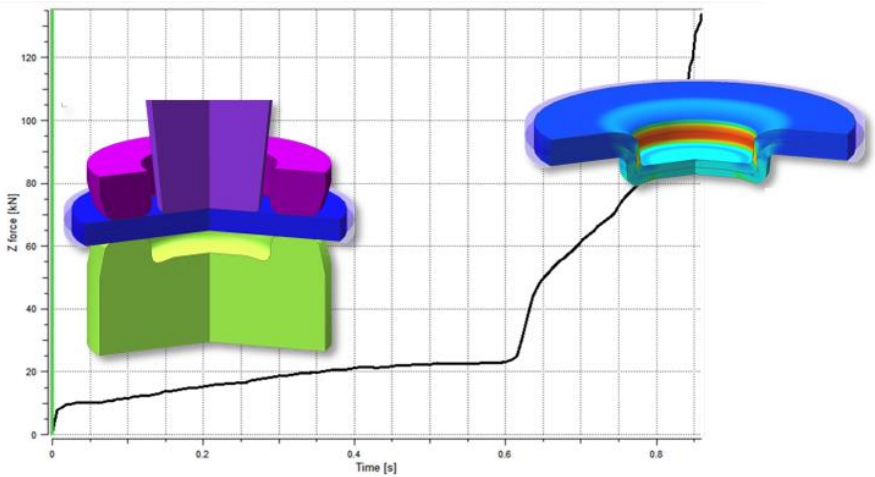
Perçinleme


2,000
1,500
1,000
500
0
Z force [N]
0
1
2
3
4
5
6
7
Stroke [mm]

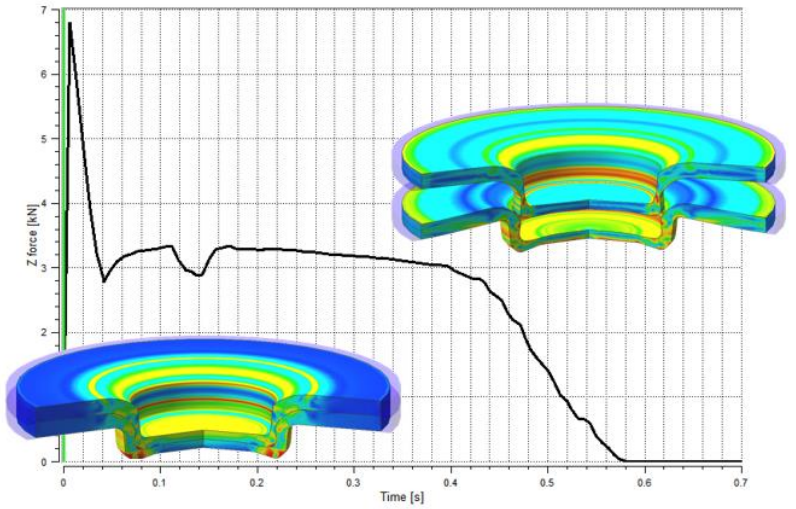

Kopfzug
STROKE : 0 mm (Model Generated by)

Kenetleme

Kenetleme kuvveti

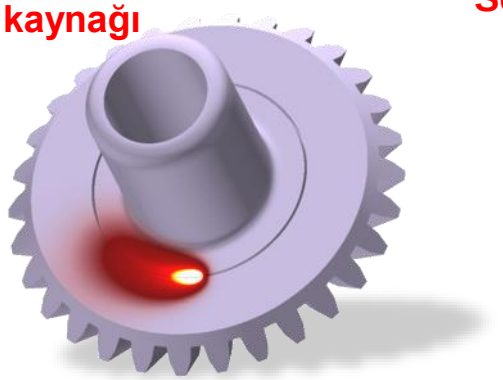


Ayırma kuvveti

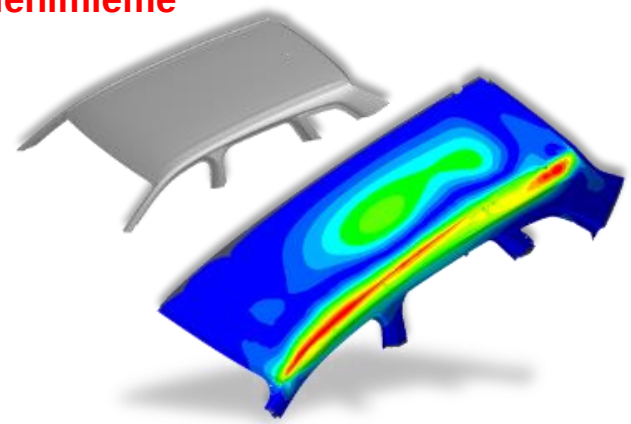


Termal Birleştirme

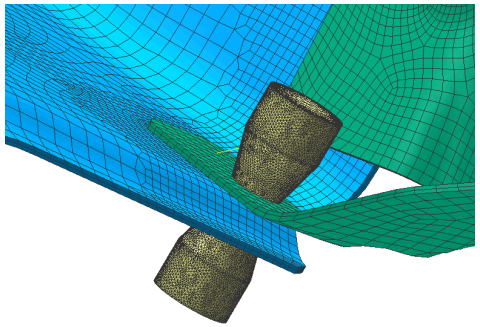
Lazer kaynağı



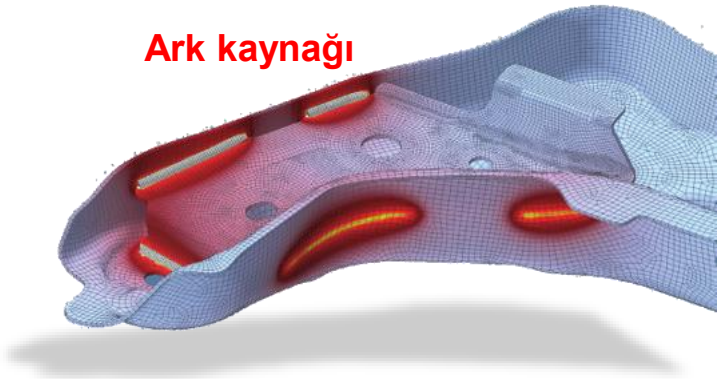
Sert lehimleme



Direnç punta kaynağı



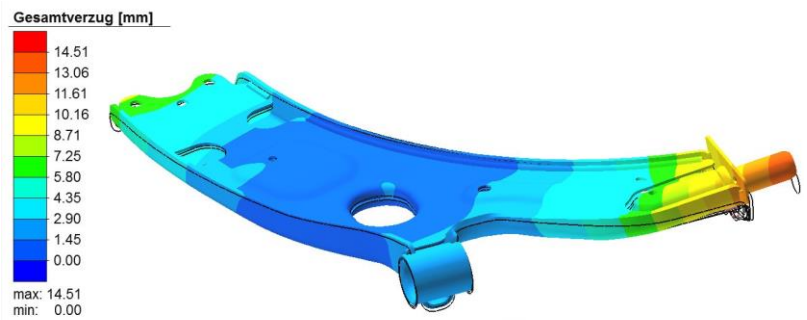
Ark kaynağı

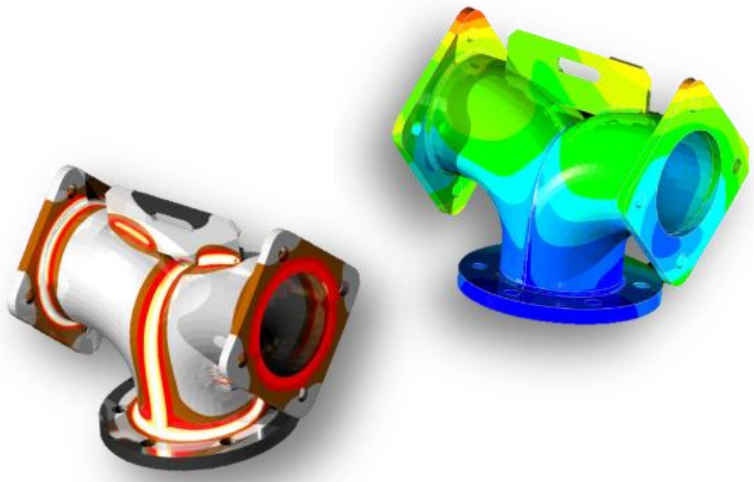


- Ark kaynağı (MIG, MAG, TIG, v.b.)
- Lazer kaynağı
- Elektron ışın kaynağı (EBW)
- Sert lehimleme (Brazing)
- Direnç punta kaynağı (RSW)
- Gerilim giderme
- Kaynak sonrası yük testleri

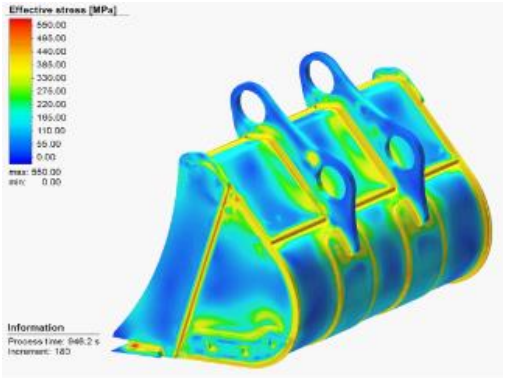
Termal Birleştirme

Çarpılma

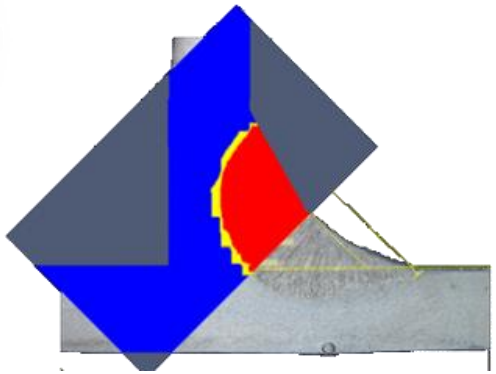




Artık gerilmeler

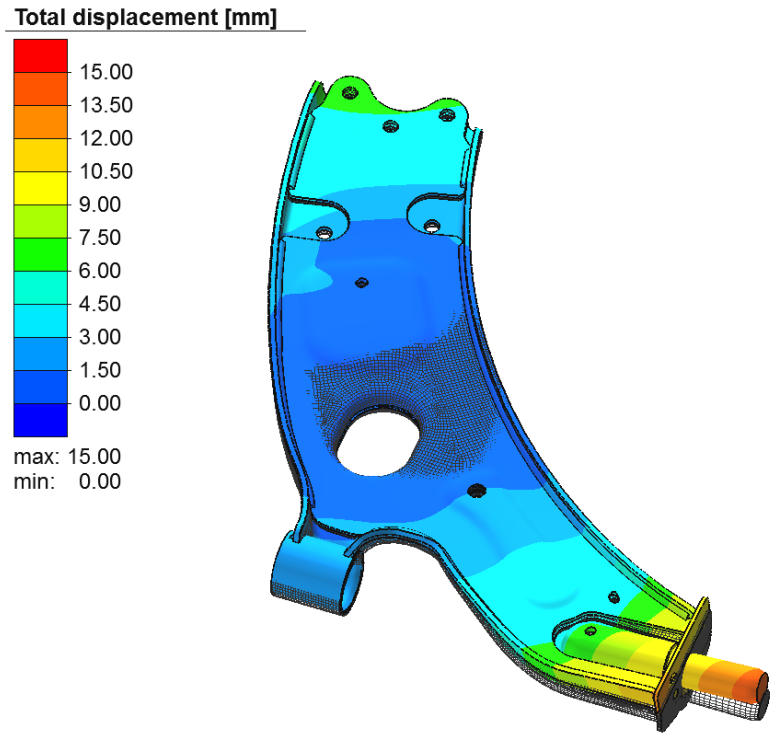


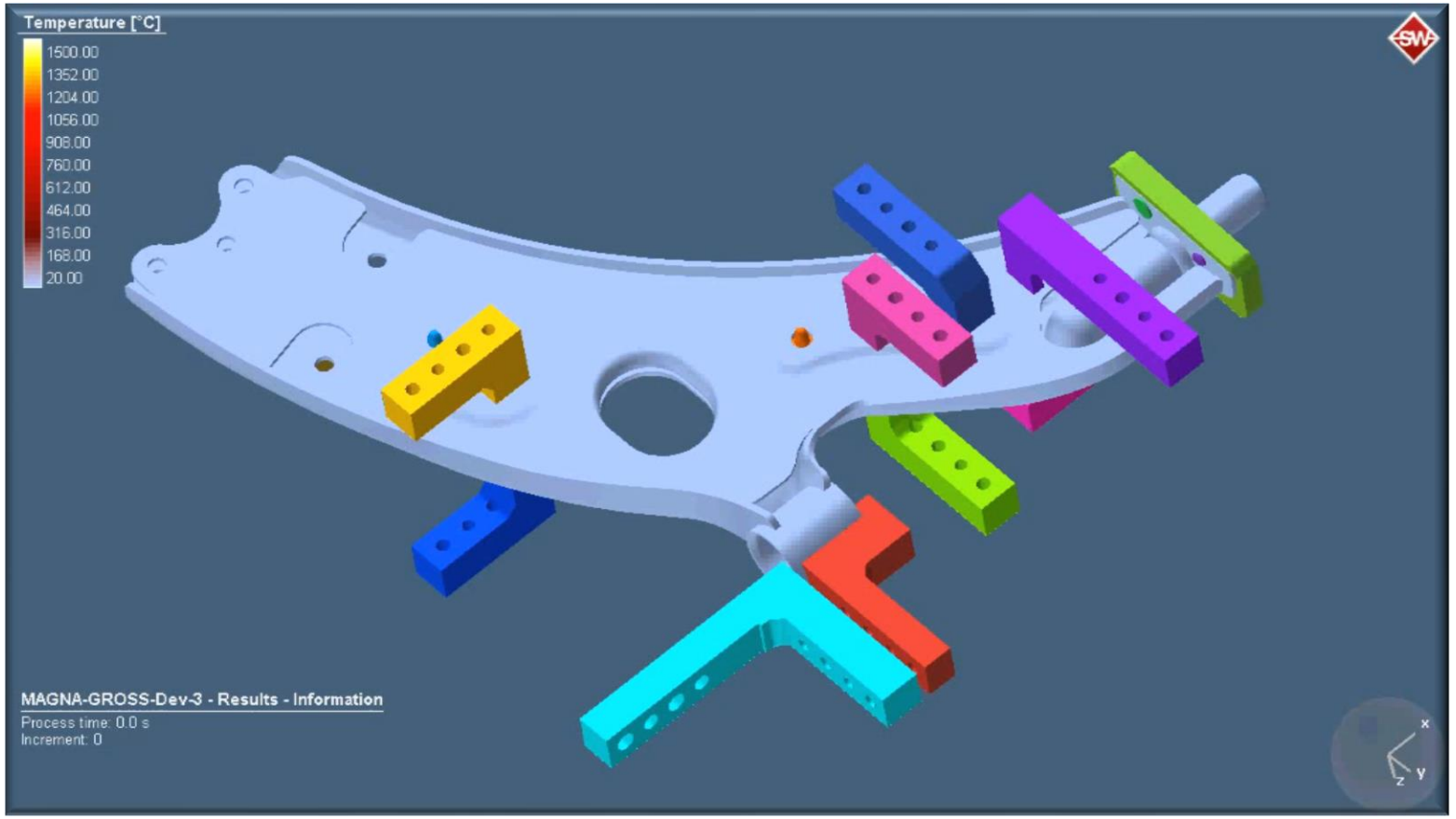
Nüfuziyet analizi



- Ergime/nüfuziyet bölgesi
- Sıcaklık dağılımı
- Çarpılma miktarı
- Artık gerilmeler
- Faz dağılımı
- Sertlik
- Kaynak sonrası mekanik özellikler
- Kaynak sırasının etkileri
- Fikstür açma zamanlarının etkileri
- Fikstür kuvvetleri
- Ön ısıtma etkileri
- Şekillendirmeden gelen etkiler

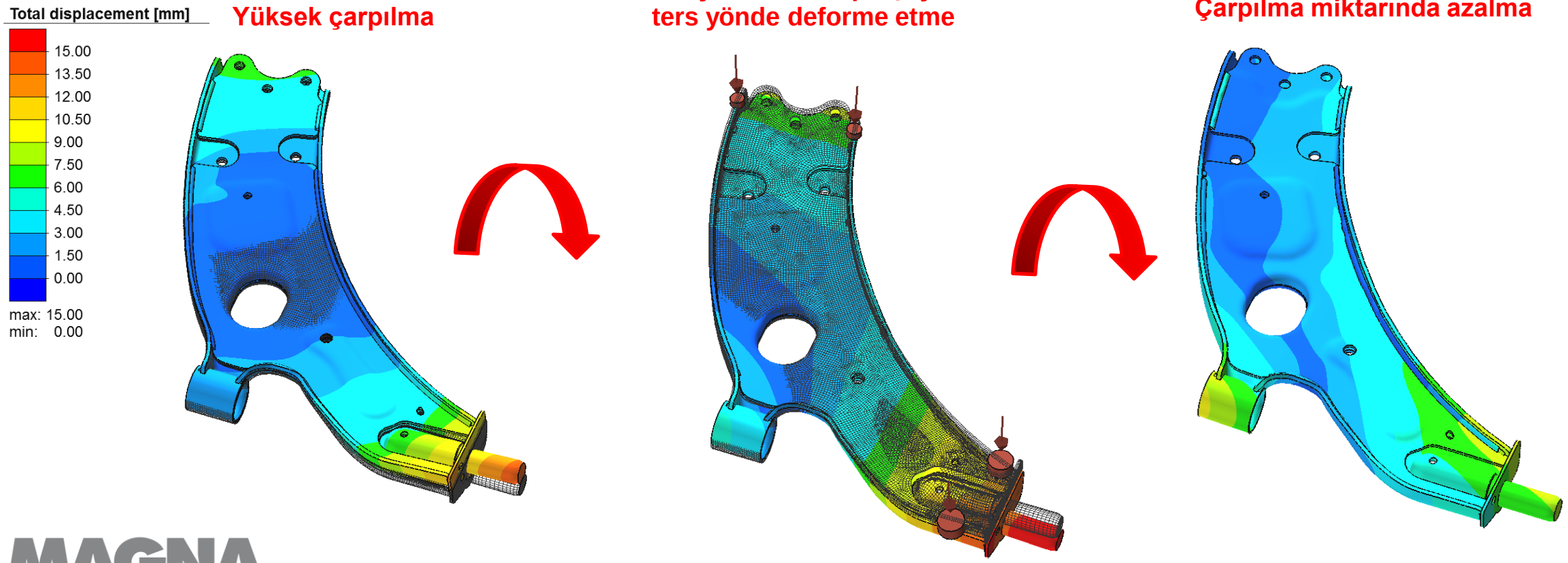
Ark Kaynağı





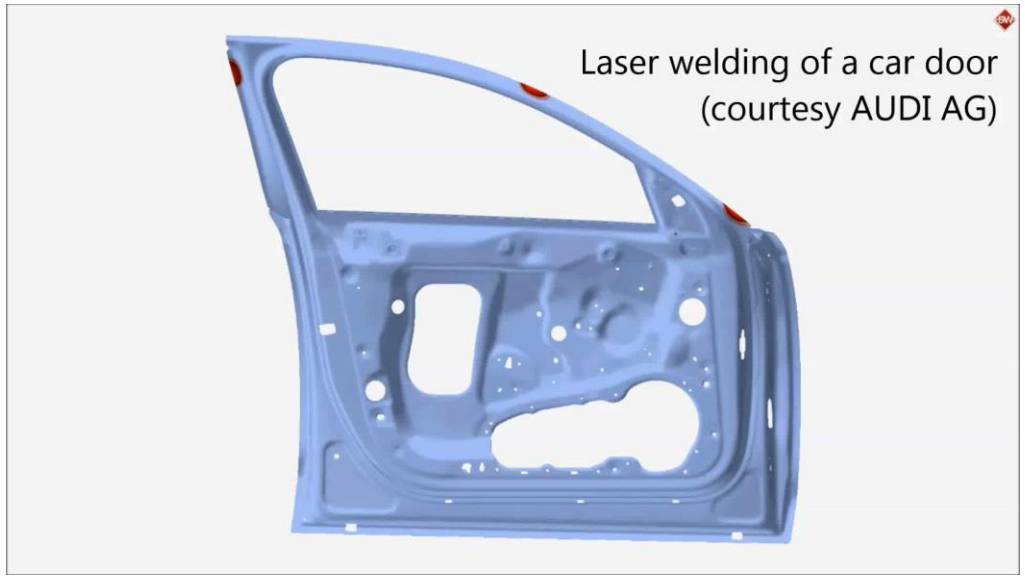
MAGNA

Ark Kaynağı



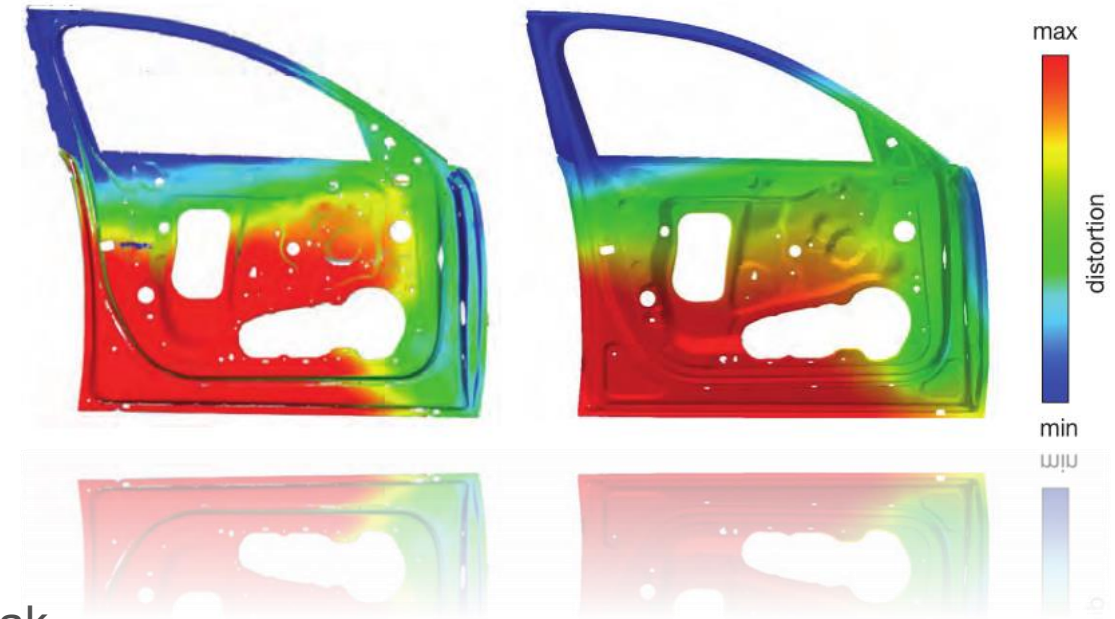
MAGNA

Lazer Kaynağı



Gerçek parça üzerindeki çarpılma dağılımı

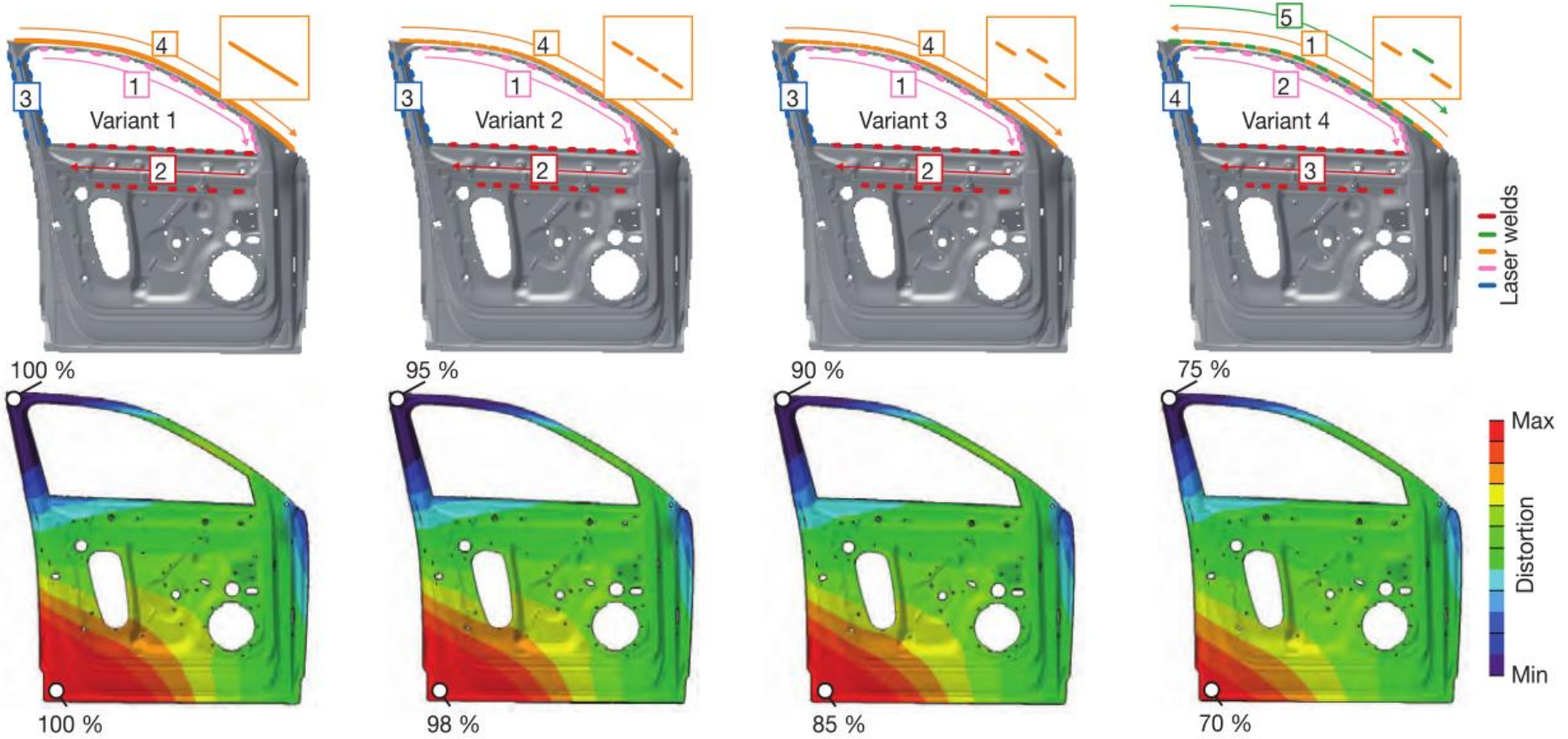
Simülasyon sonucu



Amaç: Kaynak yolu optimizasyonu ile çarpılmaları azaltmak
Malzeme: Alüminyum
Kaynak türü: Lazer kaynağı
Alt parça sayısı: 7
Kaynak sayısı: 42 - 84 adet

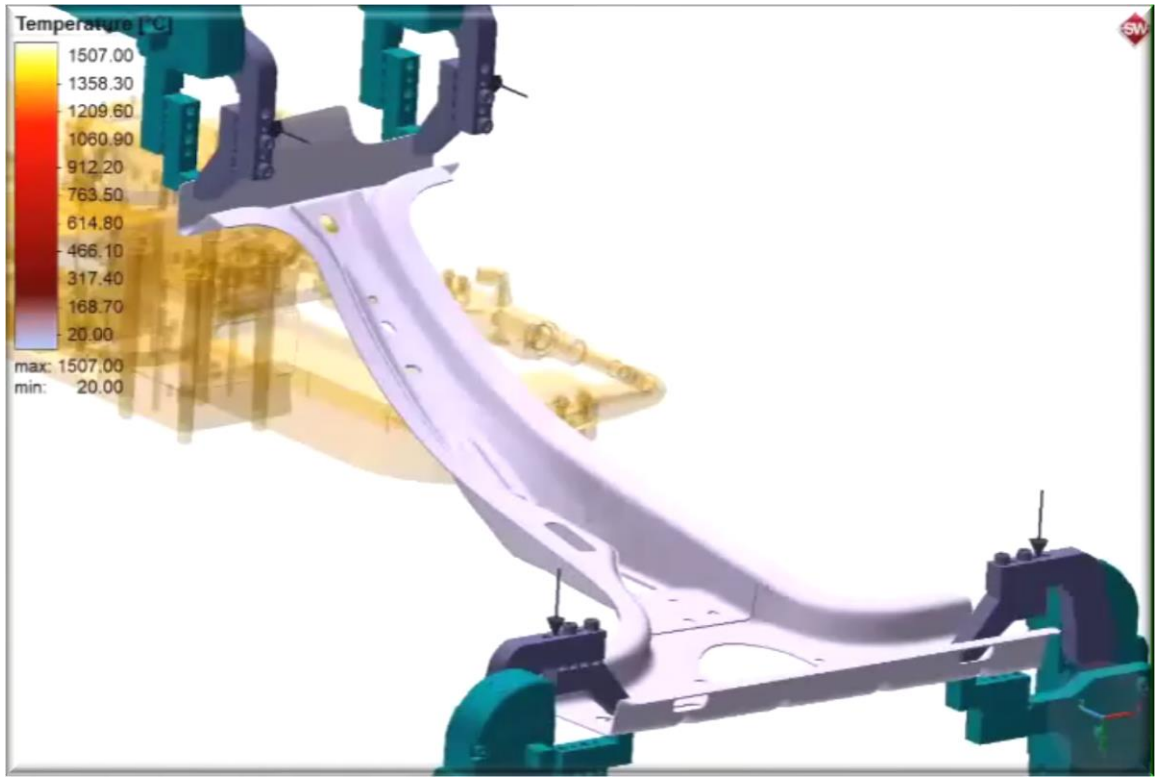
Lazer Kaynağı

Farklı kaynak yöntemleri ve sırası sonucunda meydana gelen çarpılmalar

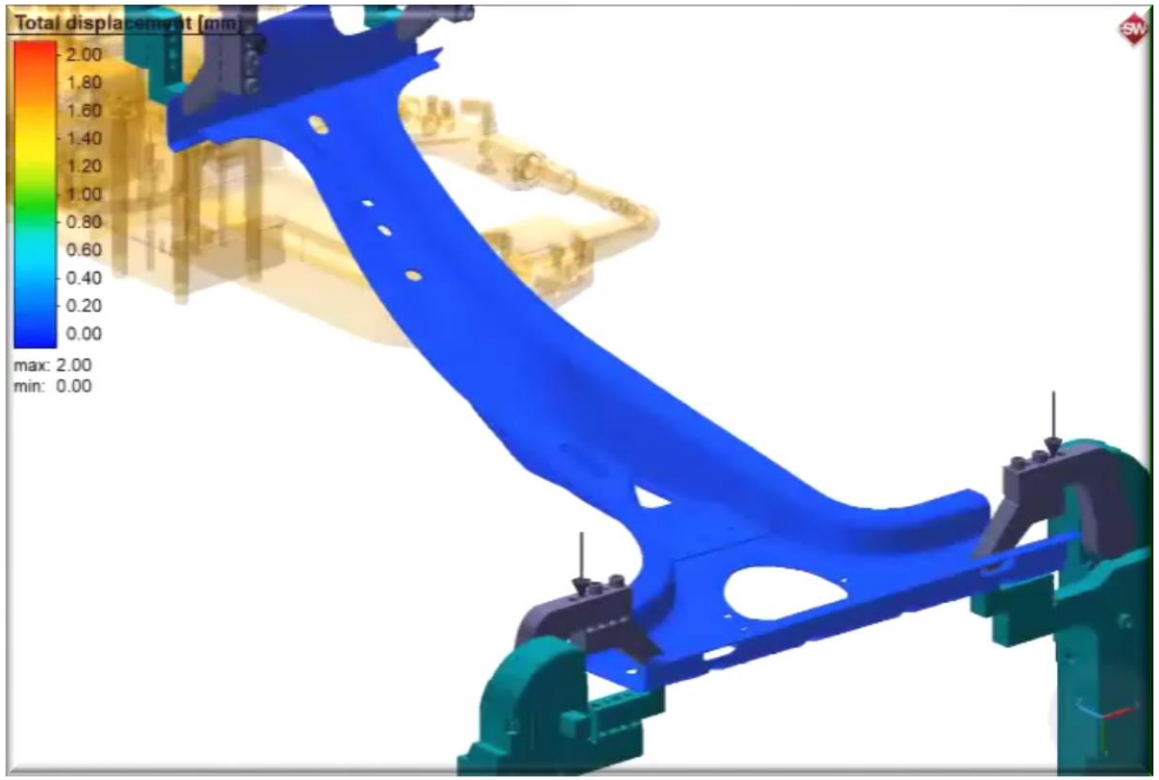


Direnç Punta Kaynağı

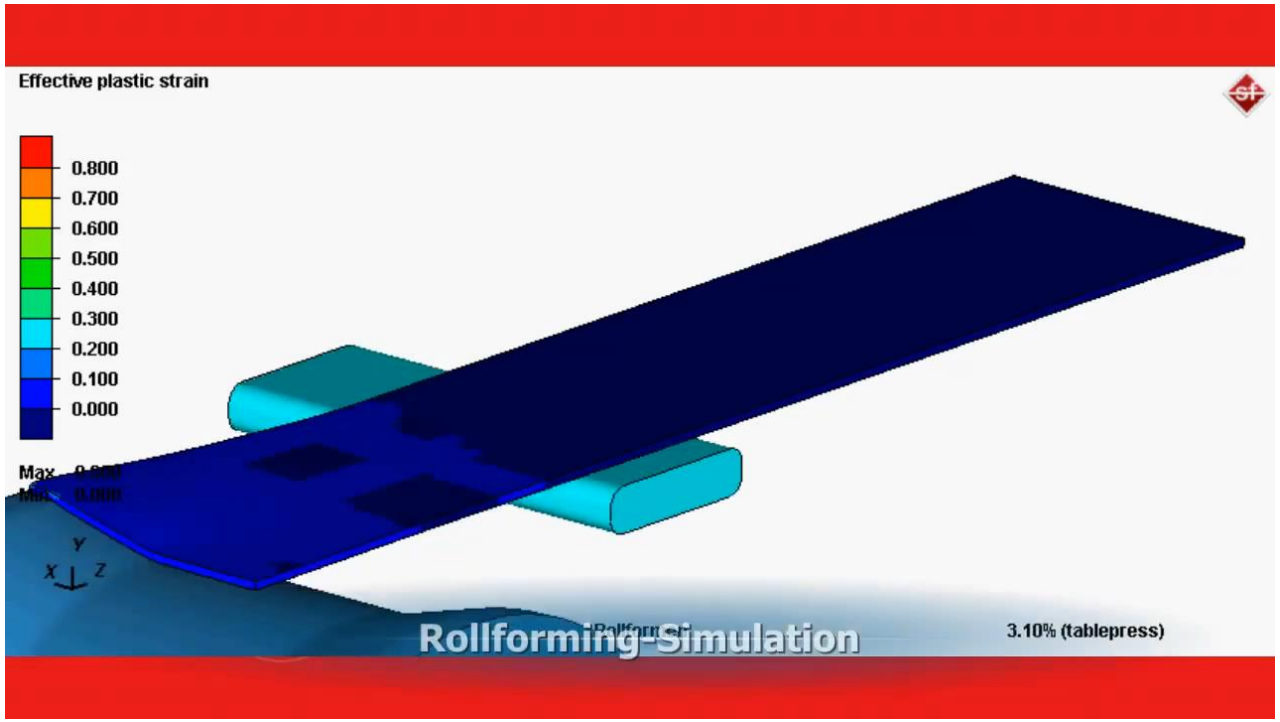
Sıcaklık dağılımı



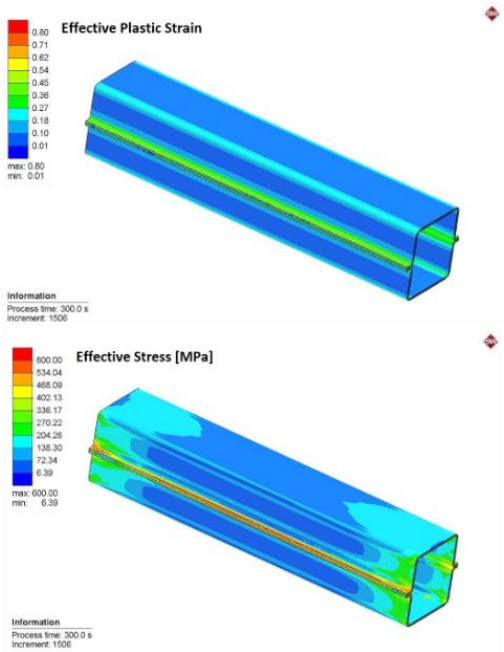
Çarpılma



Şekillendirme / Kaynak / Yük Testi



Yük testi öncesi deformasyon ve gerilme dağılımı



Enerji-deformasyon eğrisi