

# Analysis of stents

Vascular stents are wire mesh tubular devices deployed into diseased arteries with localized constrictions to prop them open for improved blood flow. Stents are inserted in their collapsed configuration, placed over a balloon catheter and guided to the area of blockage. The balloon is then inflated, expanding the stent holding the artery in its open position. The stent, thus acts as a scaffold, acting as an effective device in treating artery occlusion.

Stents need to be flexible enough to be guided through curves in blood vessels, but strong enough to hold the artery open, without failing from the loading cycles due to continuous pumping of blood in the blood vessels. Since failure of stents can lead to catastrophic results, they are subjected to extensive testing and strict design criteria, which include:

- Crimping of stent to fit on the balloon catheter
- Expansion of stent when subjected to balloon pressurization
- Bending tests to ensure flexibility
- Fatigue studies to ensure longevity of the device

## Challenges

- Conflicting design criteria (flexibility, strength, long fatigue life)
- Material selection (metal, non-metals, shape memory alloys)
- Management of residual stresses and plastic strain

## What MSC delivers to stent engineers?

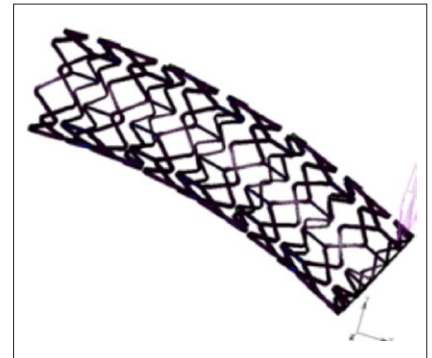
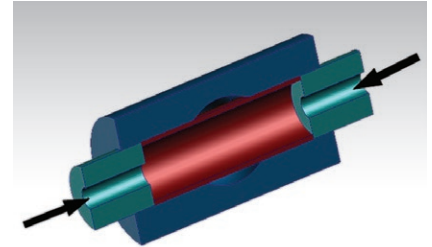
- Nonlinear analysis capabilities with ability to solve large deformation, large strain problems and accurate spring back calculations
- Materials to model metals, plastics or shape memory alloys for stents and elastomer material models for balloons and tissue
- Robust contact capabilities to study angioplasty procedure and simulate contact between balloon, stent and blood vessels
- Experimental/virtual test correlation results

## How to get started

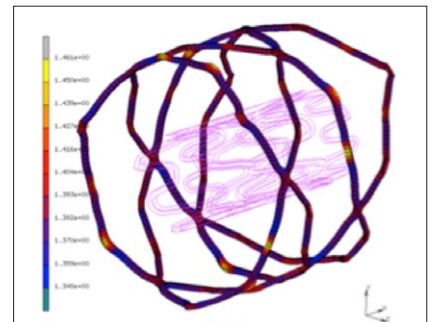
To schedule a demonstration with your local

MSC technical representative, please click here:

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Bending of a stent



Expansion of stents



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