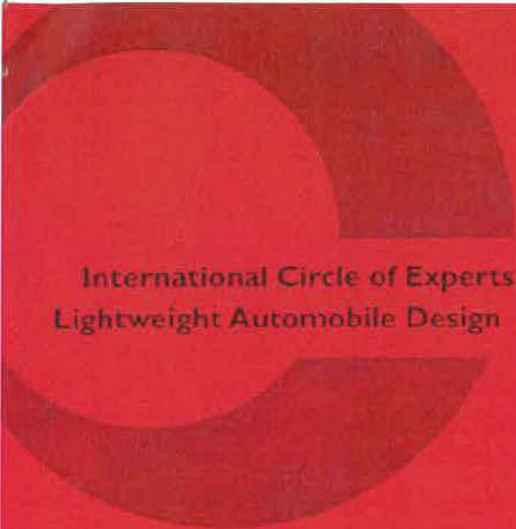




International Circle of Experts
Lightweight Automobile Design

Publisher: F. Ebert

Chair: F. Ebert
Dr. M. Woydt

Ist EUROPEAN CONFERENCE OF EXPERTS

»Hot Forming and Casting Technologies for Lightweight Automobile Design«

German/English simultaneous

27/28 November 2003

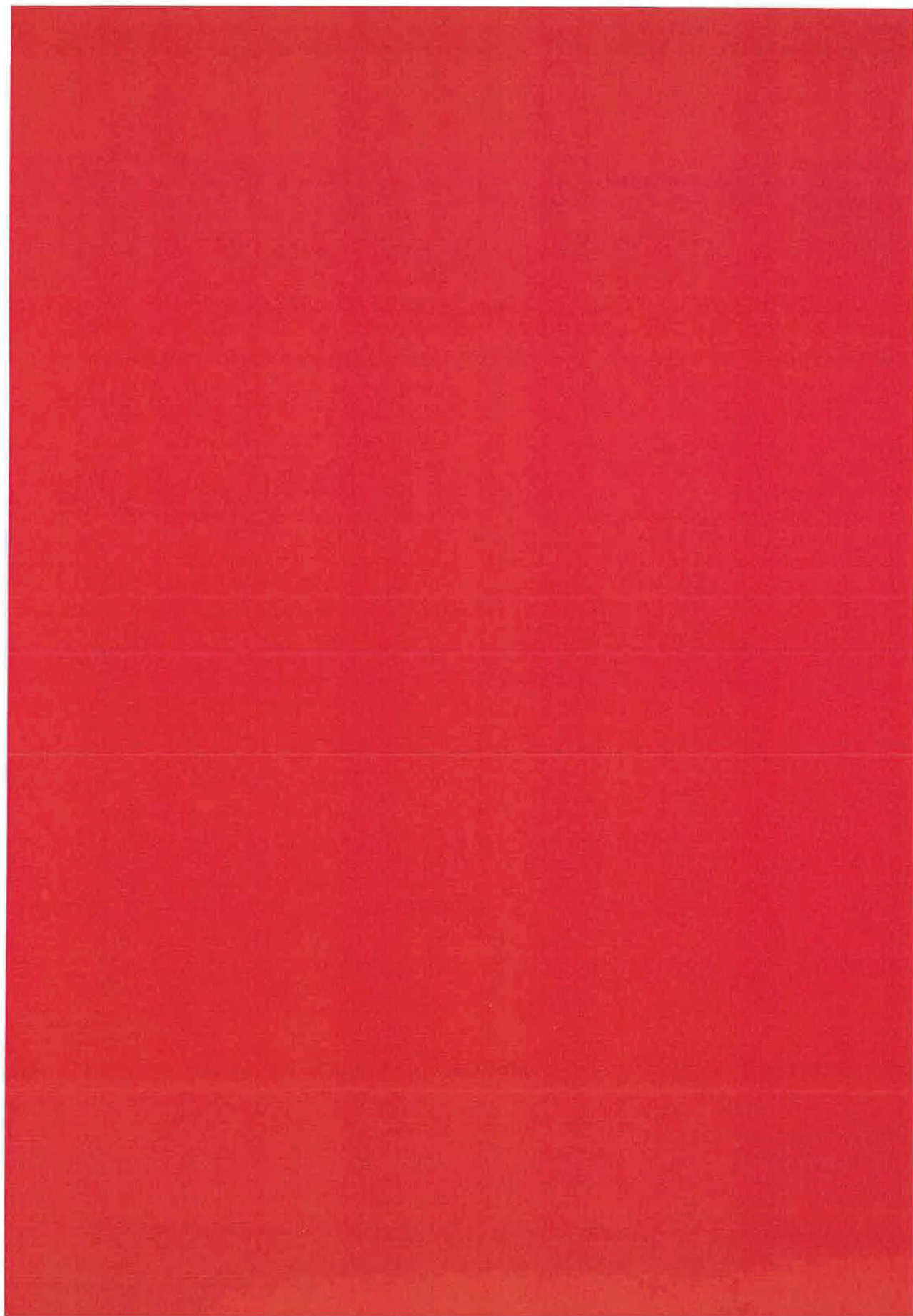
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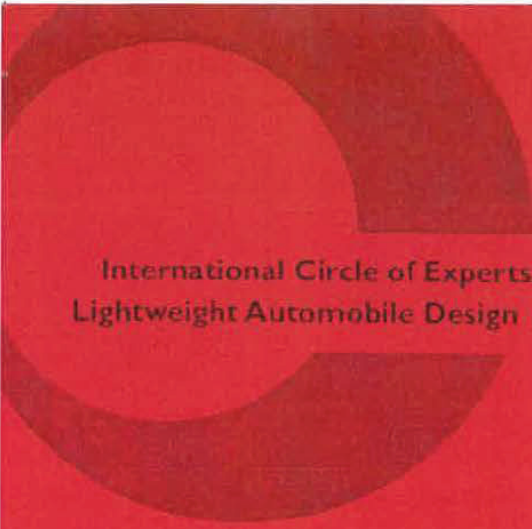


»Automotive Circle International« Conference

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**27/28 November 2003
Bad Nauheim/Frankfurt**



**International Circle of Experts
Lightweight Automobile Design**

J.-P. Laurent
ARCELOR AUTO MTB, F

**Hot formed Pre-coated boron steels:
A solution of the resistance-formability's
dilemma?**

»Automotive Circle International« Conference

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Schedule

Context and properties

Hot forming

Potential applications of USIBOR

Conclusions



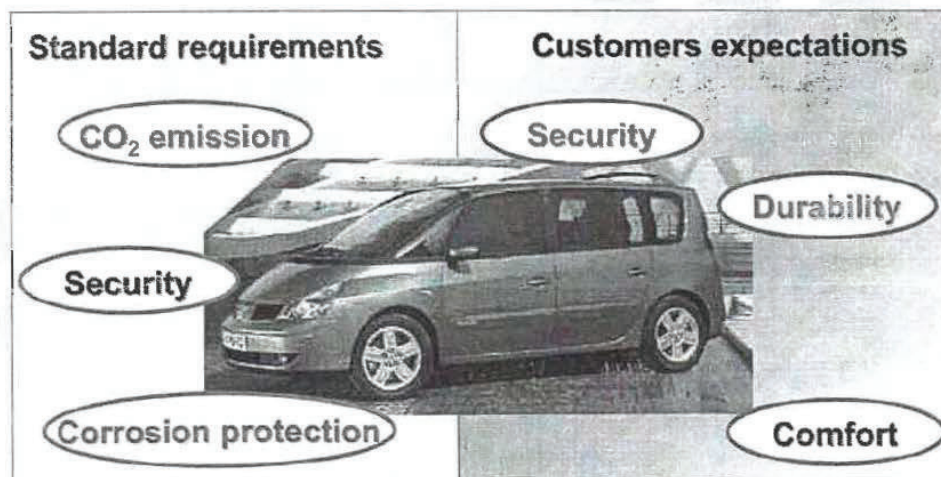
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Main trends of the automotive market



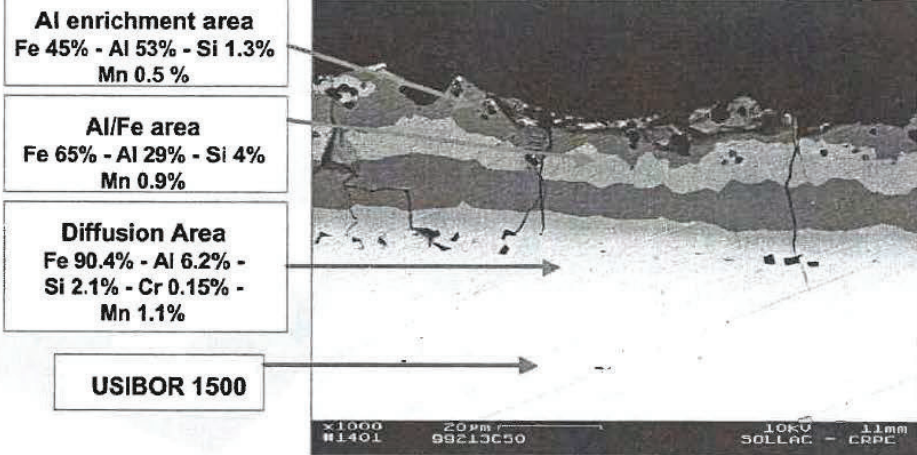
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3

SEM Microstructures In BSE Mode



ALLOYING AND THICKENING OF THE LAYER



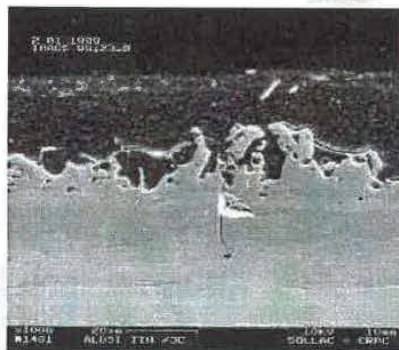
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Microstructures



SECTION OF ALLOYED AND
CATAPHORIC LAYER BY SEM
IN BSE MODE.



SEM IMAGE OF SURFACE
AFTER COMPLETE ALLOYING



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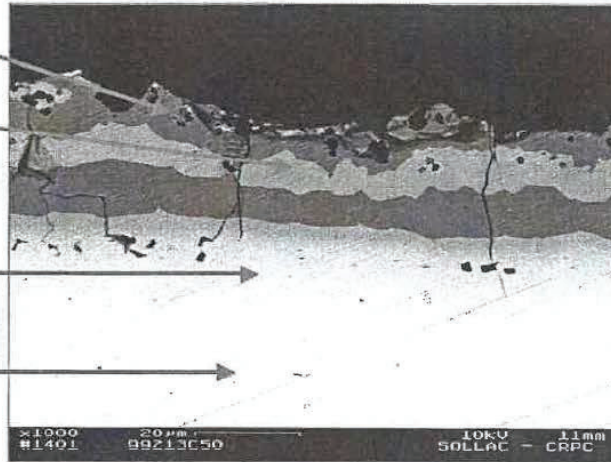
SEM Microstructures In BSE Mode

Al enrichment area
Fe 45% - Al 53% - Si 1.3%
Mn 0.5 %

Al/Fe area
Fe 65% - Al 29% - Si 4%
Mn 0.9%

Diffusion Area
Fe 90.4% - Al 6.2% -
Si 2.1% - Cr 0.15% -
Mn 1.1%

USIBOR 1500



ALLOYING AND THICKENING OF THE LAYER



USIBOR 1500 P

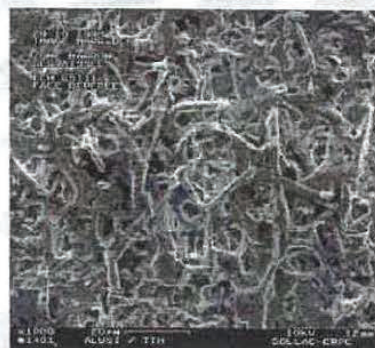
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Microstructures



SECTION OF ALLOYED AND
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IN BSE MODE



SEM IMAGE OF SURFACE
AFTER COMPLETE ALLOYING



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Spot Welding

- Spot Weldability Shows Good Results With Respect To The Welding Range.
- Studies On Electrode Life With Pre-coated Quenched Usibor, Show Results Better Than Zinc EG-coating.



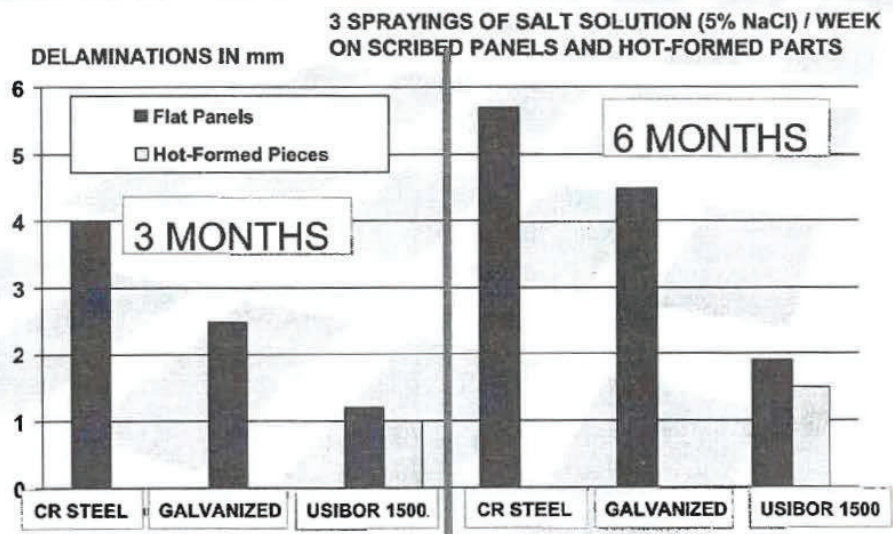
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Scab-test - 3 And 6 Months - Fos/Mer



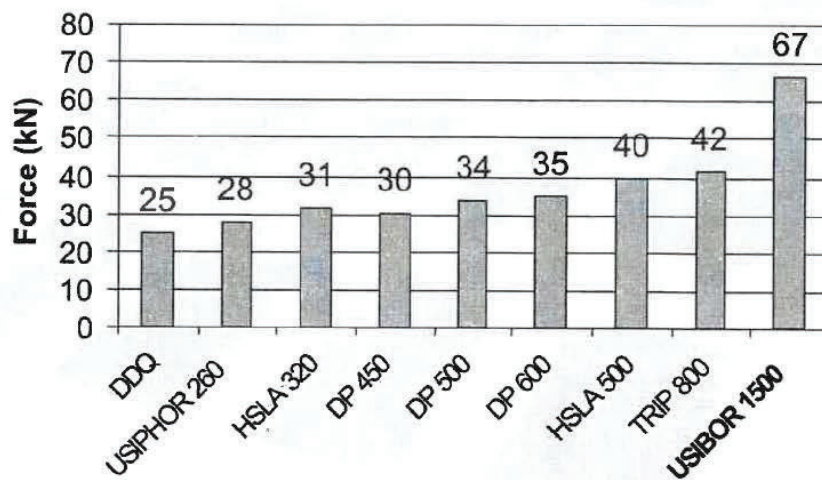
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Ultimate bending force



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Schedule

Context and properties

Hot forming

Potential applications of USIBOR

Conclusions



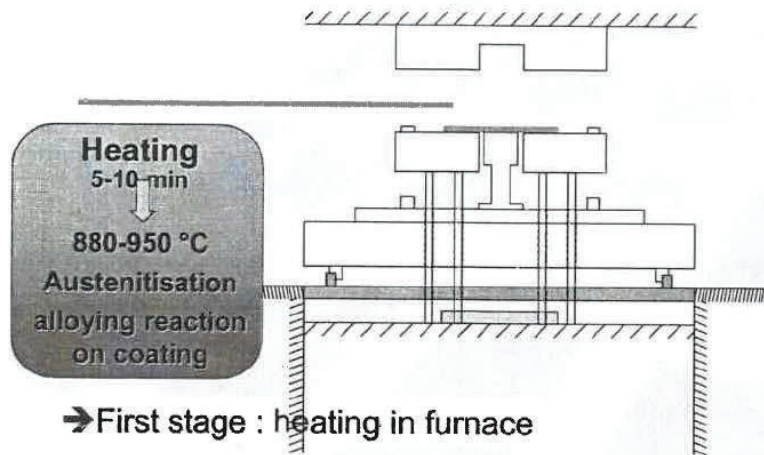
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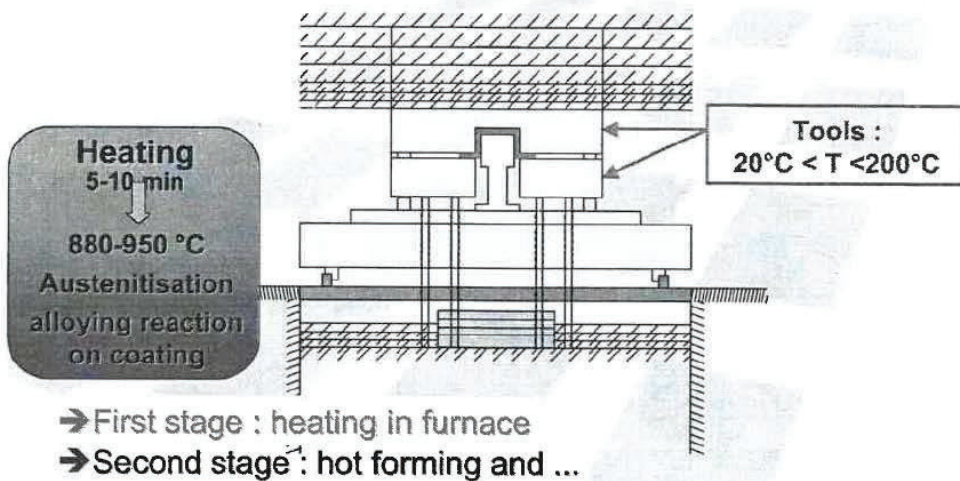
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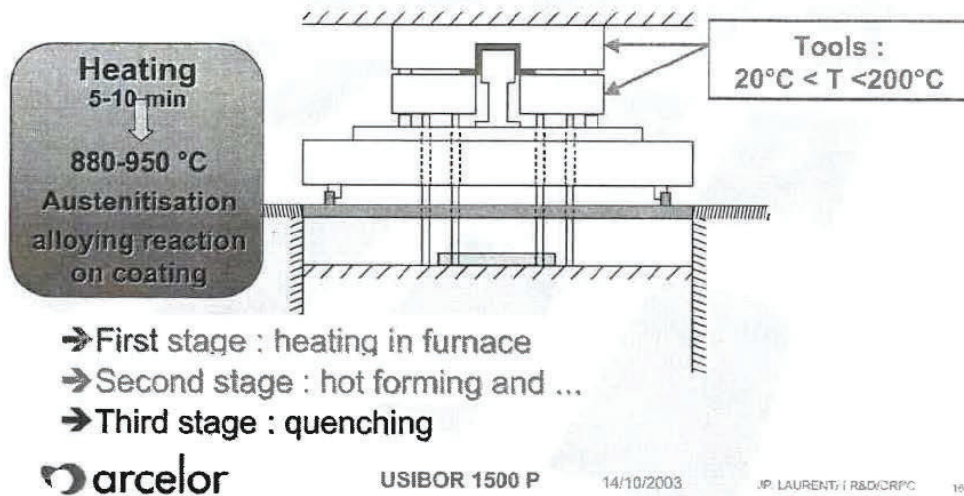
Hot stamping : what is it ?



Hot stamping : what is it ?



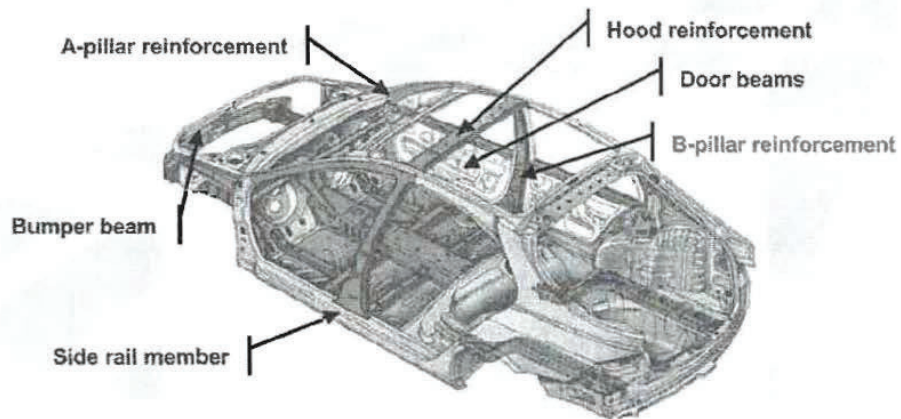
Hot stamping : what is it ?



Schedule

- Context and properties
- Hot forming
- Potential applications of USIBOR**
- Conclusions

Potential USIBOR1500P Applications



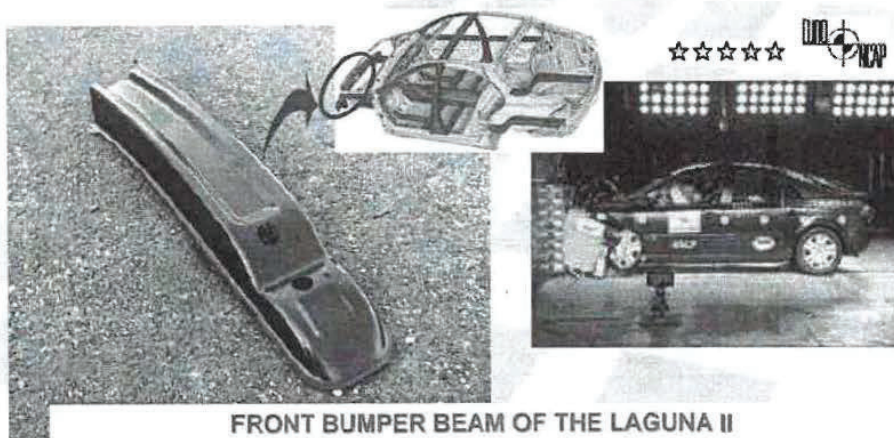
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Application : Laguna II



FRONT BUMPER BEAM OF THE LAGUNA II
USIBOR 1500 PRECOATED IN 2 mm THICKNESS
 (PHOTO WITH THE KIND PERMISSION OF RENAULT SA)



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Application : Citroën C5



FRONT BUMPER BEAM OF THE CITROËN C5
USIBOR 1500 PRECOATED IN 1.5 mm THICKNESS
 (BEFORE CATAPHORESIS)
 (PHOTO WITH THE KIND PERMISSION OF PSA PEUGEOT CITROËN)



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Application : Citroën C5



Hot blank just
before stamping



SOFEEDIT Pictures



Stamped blank
before cutting



A PILLAR REINFORCEMENT OF THE CITROËN C5
USIBOR 1500 PRECOATED IN 1.17 mm THICKNESS
 (PHOTO WITH THE KIND PERMISSION OF PSA PEUGEOT CITROËN)



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Application : Peugeot 607



FRONT BUMPER BEAM OF THE PEUGEOT 607
USIBOR 1500 BARE IN 1mm THICKNESS
(PHOTO WITH THE KIND PERMISSION OF PSA PEUGEOT CITROËN)



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Schedule

- Context and properties
- Hot forming
- Potential applications of USIBOR
- Conclusions



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Advantages Of Usibor 1500 p

- ↻ Competitive vs Aluminium
- ↻ Separation Of Forming And In-use Properties
- ↻ No Spring Back With Hot Forming
- ↻ Good Spot Weldability
- ↻ Good Perforating Corrosion Resistance



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Advantages Of Pre-coating

- ↻ Inert Gas Oven Not Necessary.
- ↻ No Scale No Need To Remove The Oxide Layer After Heat Treatment.
- ↻ No Decarburization Of Steel.
- ↻ No Temporary Protection Such As Oil Necessary.
- ↻ No Post-protection Of The Parts.
Further Hot Dipping Or Electro-coating Is Not Necessary.



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