



Instrumented Chip and Cut Analyser ICCA

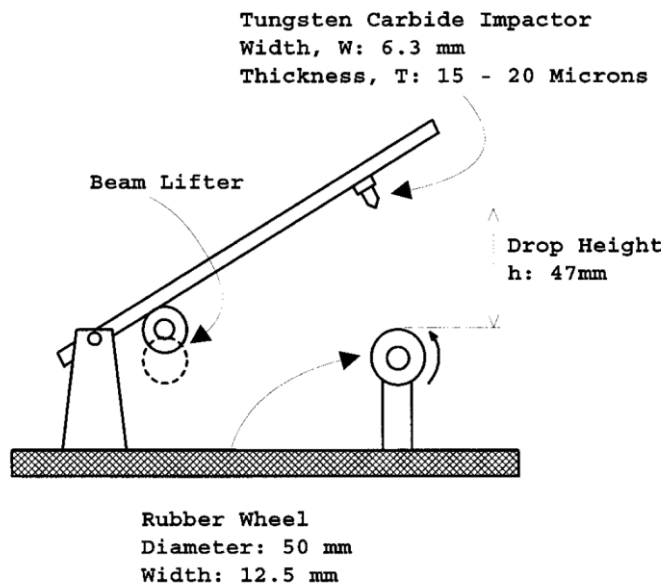
Characterizing Rubber's Resistance against Chip and Cut Behavior

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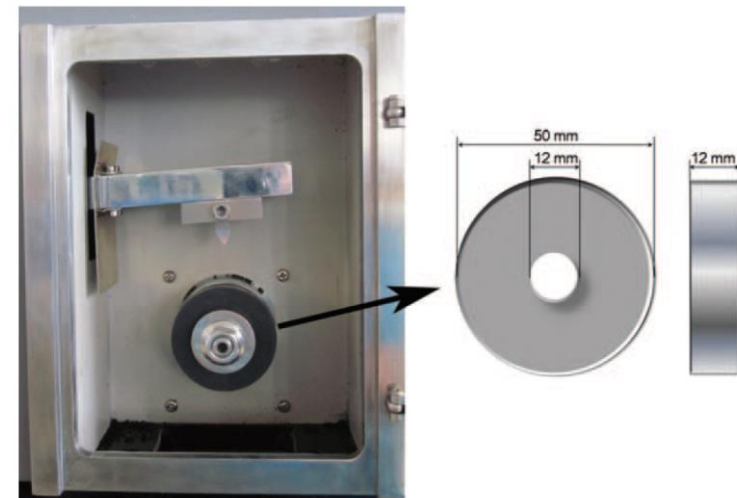
BACKGROUND

Classic CC Systems measure weight loss in BF Goodrich type CC set-up

- Process is not deterministic
- Measuring results are poor and not reproducible



C. Nah, B. W. Jo, and S. Kaang, "Cut and Chip Resistance of NR-BR Blend Compounds", *J. Appl. Polym. Sci.* **68**, 1537 (1998).



J.-H. Ma, Y.-X. Wang, L.-Q. Zhang, and Y.-P. Wu, "Improvement of Cutting and Chipping Resistance of Carbon Black-Filled Styrene Butadiene Rubber by Addition of Nanodispersed Clay", *J. Appl. Polym. Sci.* **125**, 3484 (2012).

APPROUCH

INSTRUMENTED CHIP AND CUT ANALYSER - ICCA

- ICCA controls Impact Contact Time and Repeating Frequency
- ICCA measures Impact and Friction Forces



Same Frequency, Different Sliding Time

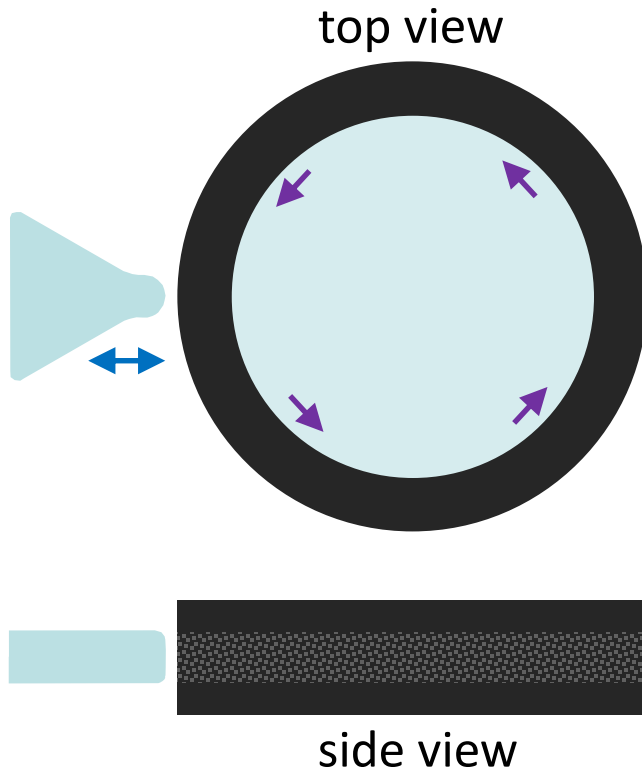


Same Sliding Time, Different Frequency

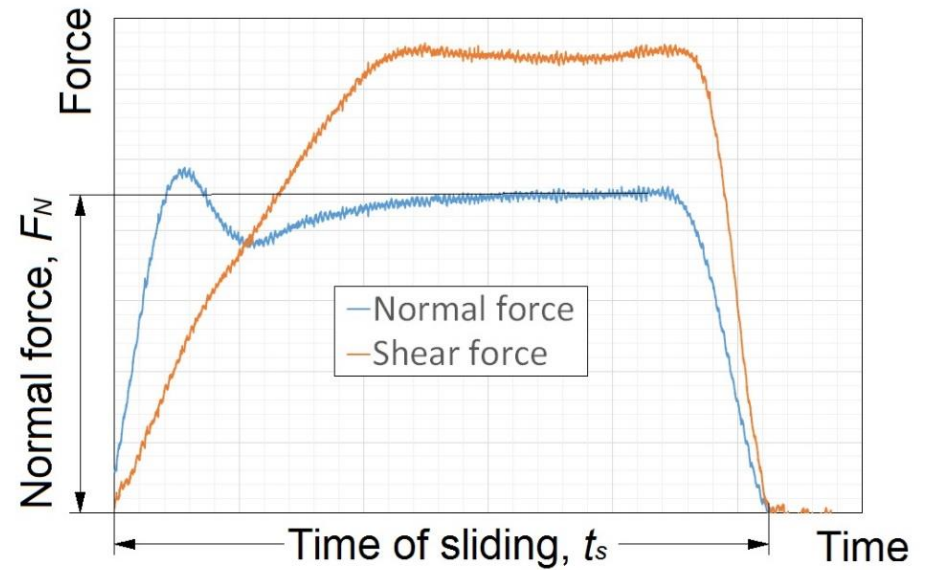


ICCA - MEASUREMENT

TEST RUN



DATA

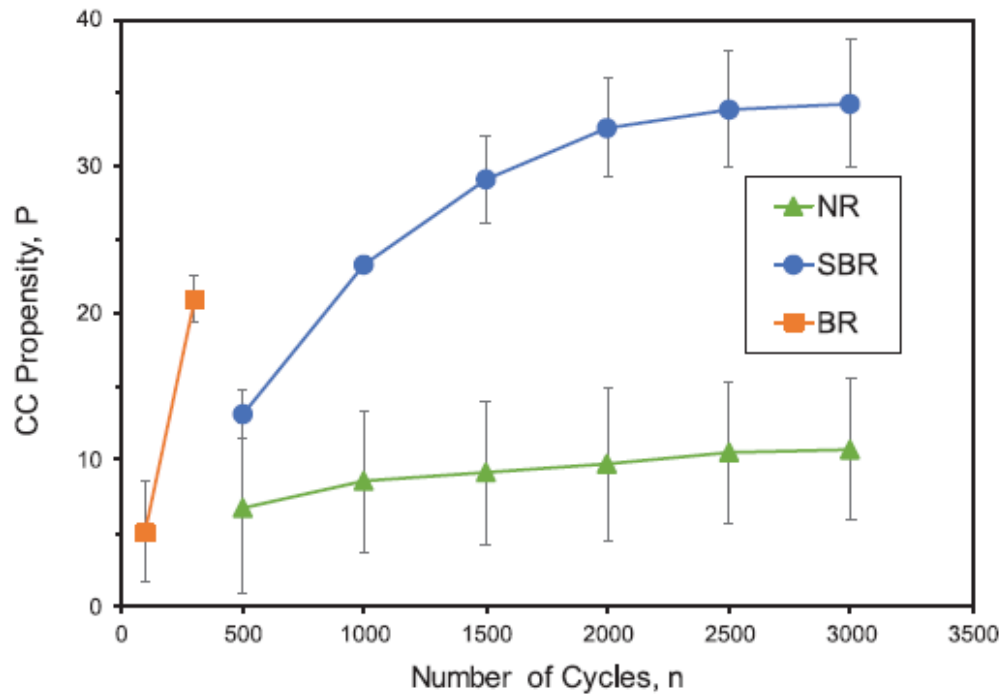


OPTICAL JUDGEMENT



ICCA - DATA EVALUATION

- Chip and Cut propensity (P) is calculated from force data

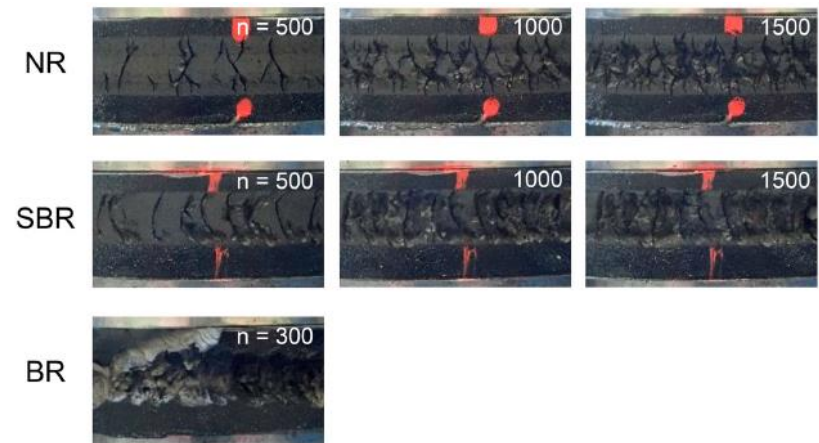
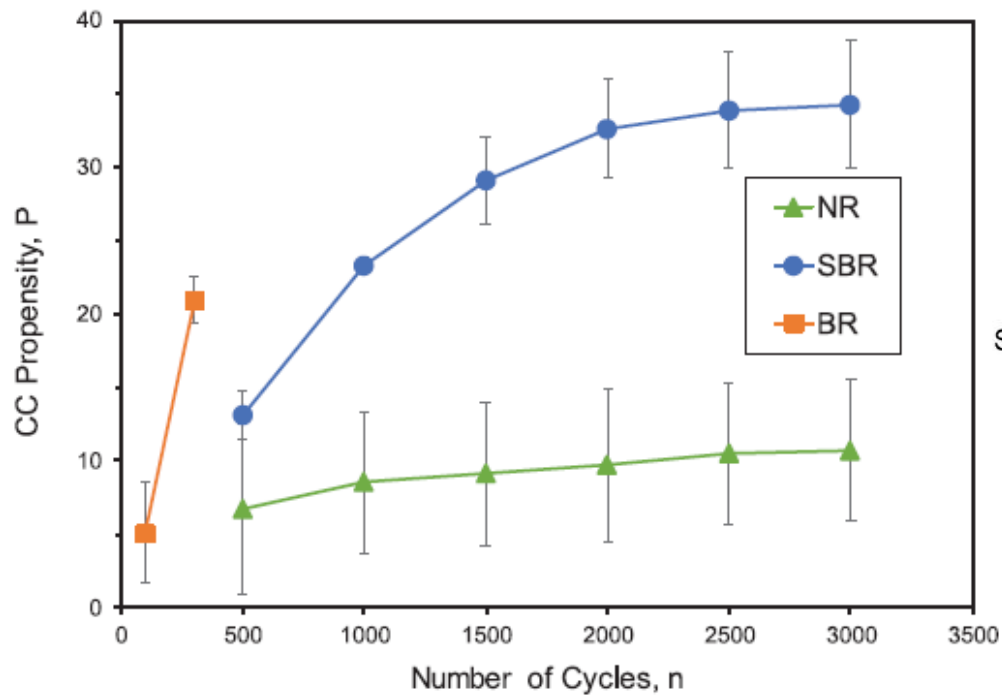


Magnitude of (P) clearly ranks rubber compounds according to their chip and cut resistance

Slope of P indicates long term resistance to chip and cut

ICCA - DATA EVALUATION

- Chip and Cut propensity (P) correlates well to visual result and tire field tests



Key Features

Instrumented Chip and Cut Analyser
ICCA



- Programmable and Controlled Loading
- Integrated Force Instrumentation
- Automatic and Standardized Evaluation of C&C (P-Parameter)
- Correlation to Field Tests

Literature

Proof of concept

2018_Plastics Rubber and Composites_Characterisation of cut and chip for NR SBR BR

2019.02_RFP_Quantification of chip and cut of basic rubber

Comparision and correlation with field data

2020.06_KGK_CC:Comparison between lab and real tire

Comparison to crack growth data

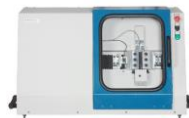
2020_AdvPlastics Rubber and Composites_Characterisation of cut and chip for NR SBR BR

Comparison with FEM simulation

2020_AllenPress_FEM and critical plane analysis of a CC experieiment

COESFELD

MATERIALTEST



TESTING EQUIPMENT

for Plastics and Rubber

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