Case Study: Chatter Resolution in Cold Mill

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Overview

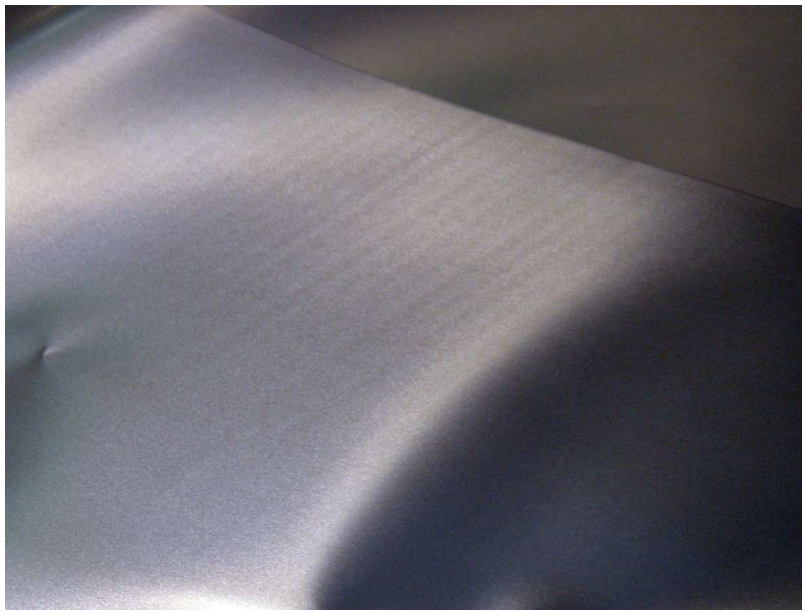
- History
- Analysis methods
- Resolution
- Benefit to client

Problem History

- **Problem existed on mill for 5 yrs prior to RE involvement**
  - Plant disqualified from various customers for sheet defects only visible upon secondary forming operations
  - New products ran at slower speed to avoid defects
- **Problem resurfaced after an emergency motor bearing replacement**
  - Speed limited to 600 m/min (max speed 1300 m/min)
- **Plant requested help from**
  - FAG bearing manufacturer/SMS mill builder/Universities
  - Problem not resolved

Problem Overview

- **At speeds > 600 m/min transverse lines visible across sheet**
- **Spacing approximately 22 mm**
- **Not visible at speed < 600 m/min**

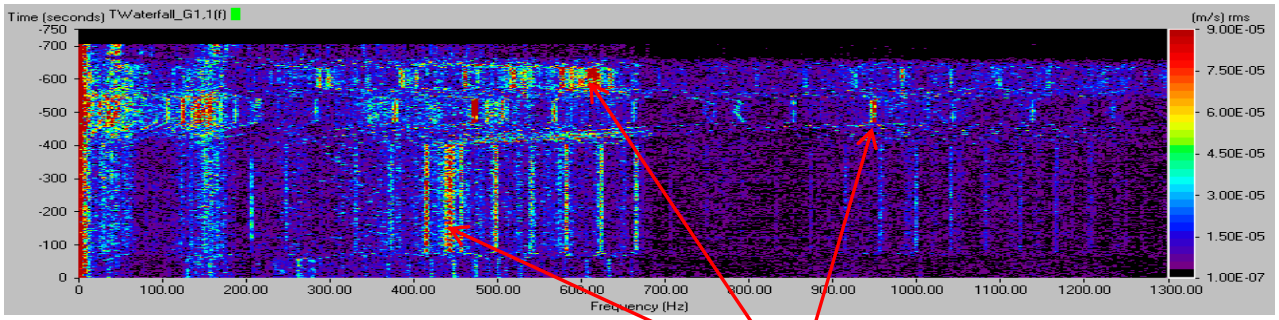


Problem Evaluation

- **Evaluation of resonant frequencies of mill**
- **Carried out analysis of typical contributors to forced vibration**
- **Evaluated condition of various mill components**
  - Bearings
  - Hydraulics
  - Couplings
- **Evaluated roll grind shop**
- **Assessed plant capability to detect problem**
  - Using plant-based equipment

Problem Data Analysis

- **Not resonance issue**
  - Defect is visible in accelerometer measurements at all speeds
- **Evaluation of hydraulics/couplings showed no issues**
  - Calculated frequencies did not match visible defect
- **Calculated frequencies closely matched bearing defect in BUR**
  - Not exact match

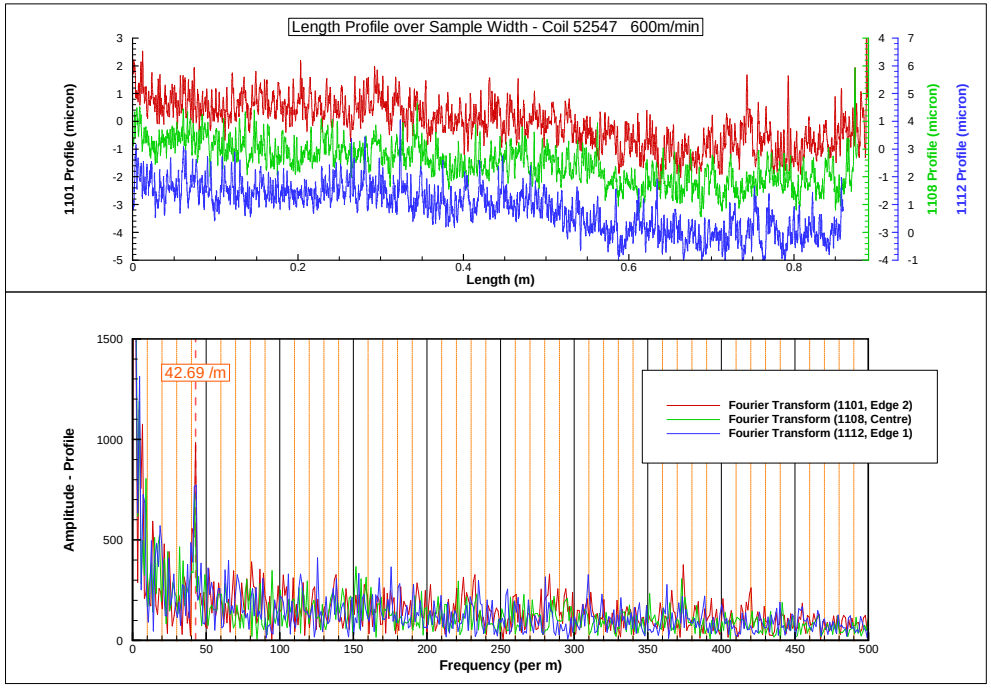


Top Back-up - OS

22 mm markings

Data Analysis

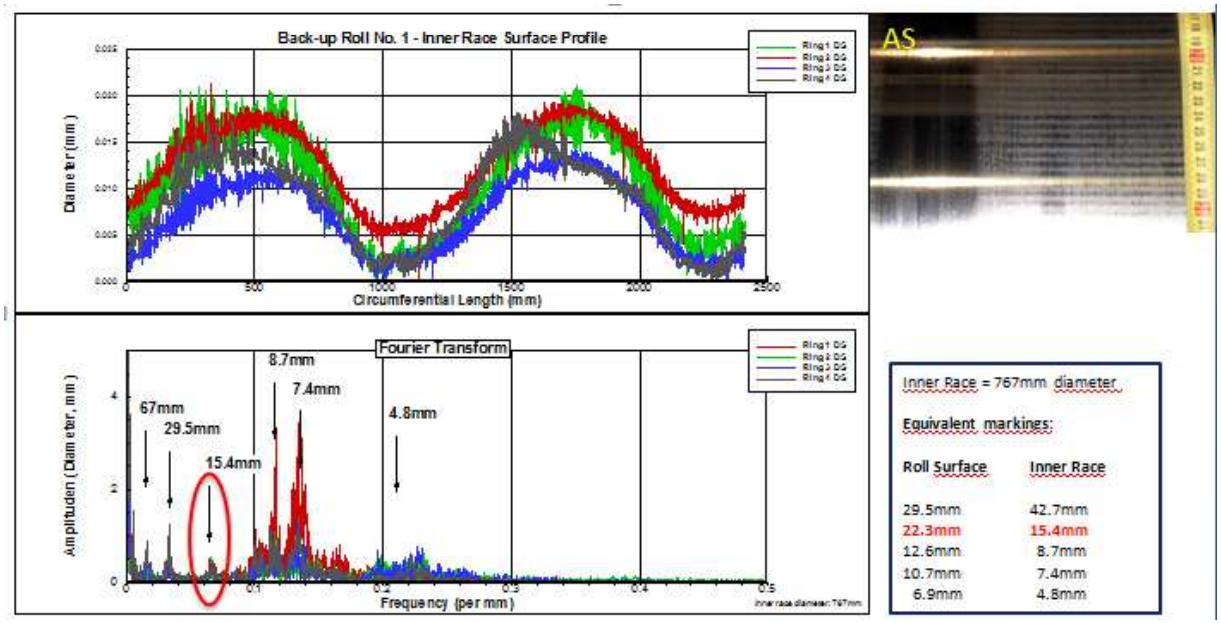
- **Proved defect present at all speeds**
  - Not visible to naked eye below 600 m/min but still present (plant equipment)



42.69/m = 22mm defect spacing

Problem Data Analysis

- **Evaluation of roll grinders showed rolls were being ground with defects**
- **Evaluation of roll surfaces (plant equipment) demonstrated that surface was marked**
  - Origin found to be bearing journals on roll necks



Problem Resolution

- **Ran trial with new BURs and bearings**
  - No defects at any speed
  - Combinations of new/old BURs and bearings
    - Defects visible both old BUR/new bearings & new BUR/old bearings
  - Suggested bearing upgrades to allow full speed with all rolls
  - Suggested maintenance/upgrades to grinders to eliminate “ground-in” defect
- **Developed online monitoring system for detection of defect at all times**
  - iba based system tied directly to plant data acquisition

Benefit to Client

- **Problem source uncovered**
- **Immediate steps for resolution recommended**
- **Ongoing maintenance SOP developed**
- **Online detection system eliminates customer complaints**
- **Demonstrated that speed increase to mill max was possible after recommendations carried out.**