RAILCAR THAWING

INTRODUCTORY
DESIGN CONCEPTS

APEC
THERMAL

WHY THAWING?

COMMON FREEZING ISSUES

THAWING OBJECTIVES

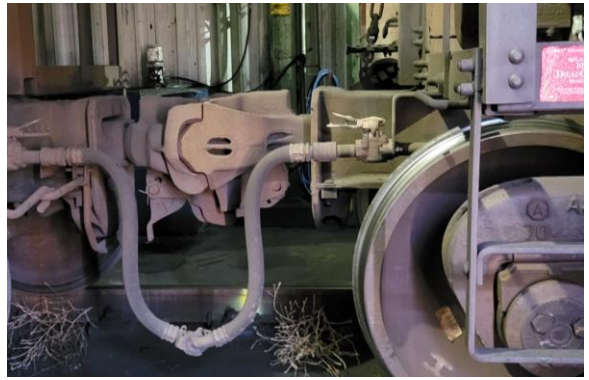
COMMON FREEZING ISSUES

1. UNACCEPTABLE UNLOADING RATES
   - RAILCAR MECHANISMS ARE UNABLE TO OPERATE
     - COMMON IN HOPPER CARS
     - FROZEN CHUNKS WON'T GO THROUGH PIT GRATE

2. DEMURRAGE CHARGES
   - BULK MATERIAL DOES NOT FLOW OR RELEASE FROM THE CAR
     - STUCK TO SIDE OF RAILCAR AFTER BEING ROTATED
     - WON'T COME OUT OF HOPPER CARS

3. INJURIES AND LABOR COSTS
   - MANUAL THAWING CAN BE UNSAFE, INEFFECTIVE, AND INEFFICIENT
     - USING PROPANE TORCHES FOR LONG PERIODS OF TIME
     - HITTING SIDES WITH SLEDGEHAMMERS TO DISLODGE MATERIALS

4. RAILCAR DAMAGES
   - ALTERNATIVE THAWING METHODS CAN DAMAGE RAILCARS
     - HEAT BEING APPLIED TO CRITICAL AREAS OF THE RAILCAR
     - EXCESSIVE HEAT CAN DAMAGE RAILCARS



THAWING OBJECTIVES

1. REMOVE ALL MATERIAL FROM FROZEN RAILCAR AT DESIRED UNLOAD RATE
2. ELIMINATE HAZARDS AND INJURIES ASSOCIATED WITH MANUAL THAWING AND UNLOADING METHODS
3. ELIMINATE RAILCAR DAMAGE FROM MISAPPLIED AND EXCESSIVE HEAT
4. MINIMIZE LABOR AND UTILITY EXPENSES NEEDED DURING THE THAWING PROCESS
5. REDUCE FROZEN MATERIAL CHUNKS FOR DOWNSTREAM MATERIAL HANDLING

RAILCAR THAWING

UNLOADING

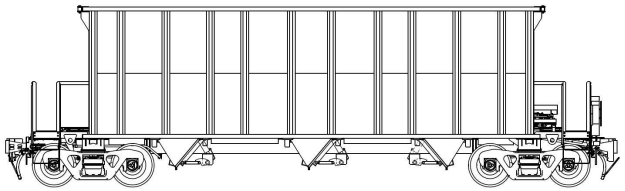
HEATING TYPES

APPLYING HEAT

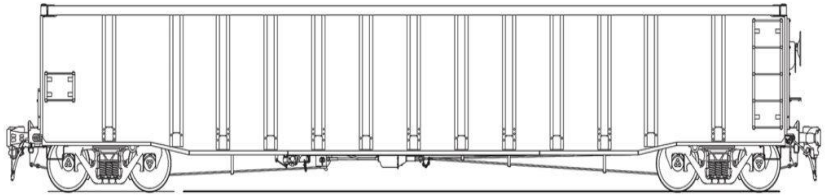
DESIGN CONSIDERATIONS

UNLOADING

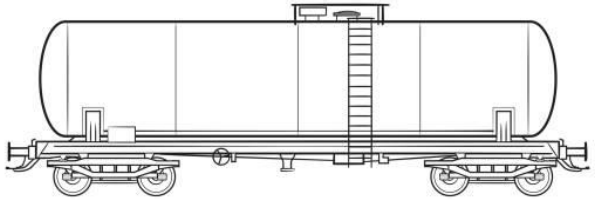
HOPPER CAR (BOTTOM UNLOADING)

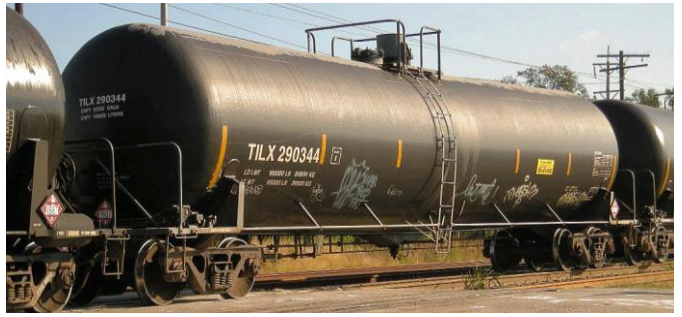


GONDOLA CAR (ROTARY UNLOADING)



TANK CAR (PUMP UNLOADING)





HEATING TYPES

GAS-FIRED RADIANT HEATERS

- TRANSFERRING HEAT VIA RADIATION
- VENTILATION REQUIRED
- HIGHER HEATER MAINTENANCE

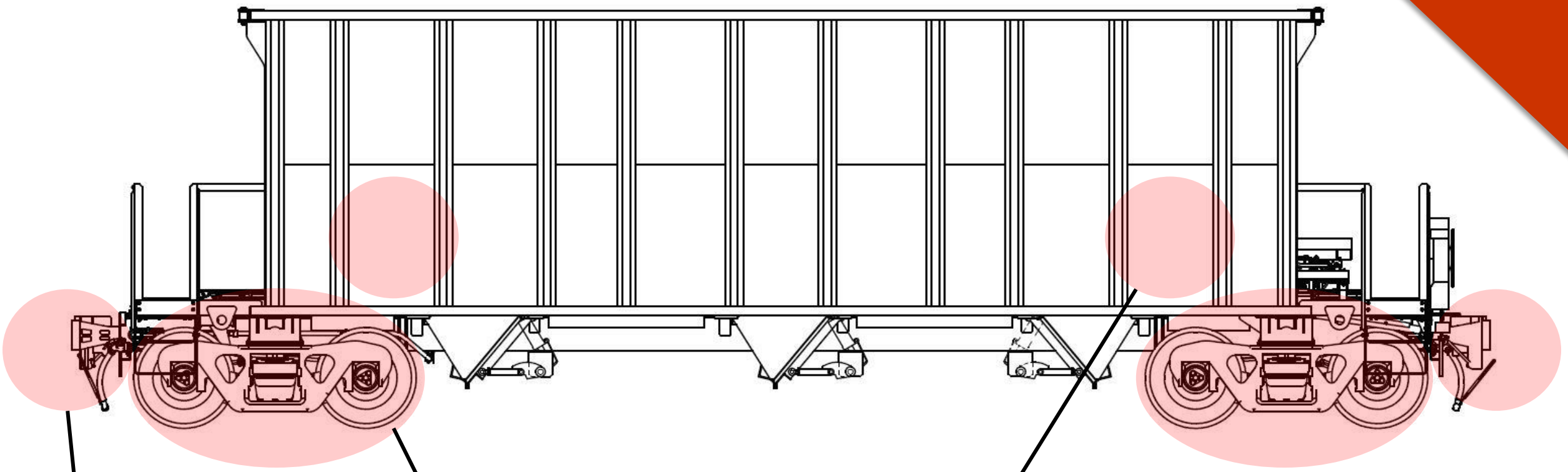
ELECTRICAL INFRARED HEATERS

- TRANSFERRING HEAT VIA RADIATION
- SAFE, RELIABLE, AND CONSISTENT
- HIGHER UTILITY COSTS

STEAM GENERATORS

- TRANSFERING HEAT VIA CONVECTION
- PUSH STEAM THROUGH A HEATER COIL INSIDE RAILCAR

HEAT SENSITIVE AREAS



AIR BRAKE HOSE

TRUCKS

MANUFACTURER EQUIPMENT

- SIGNS AND MARKERS
- ELECTRONIC TRACKING DEVICES
- CONTROL DEVICES

POSSIBLE OTHERS

- ELECTRONICS
- CYLINDERS
- MARKED NOT TO HEAT

DESIGN CONSIDERATIONS

TIME

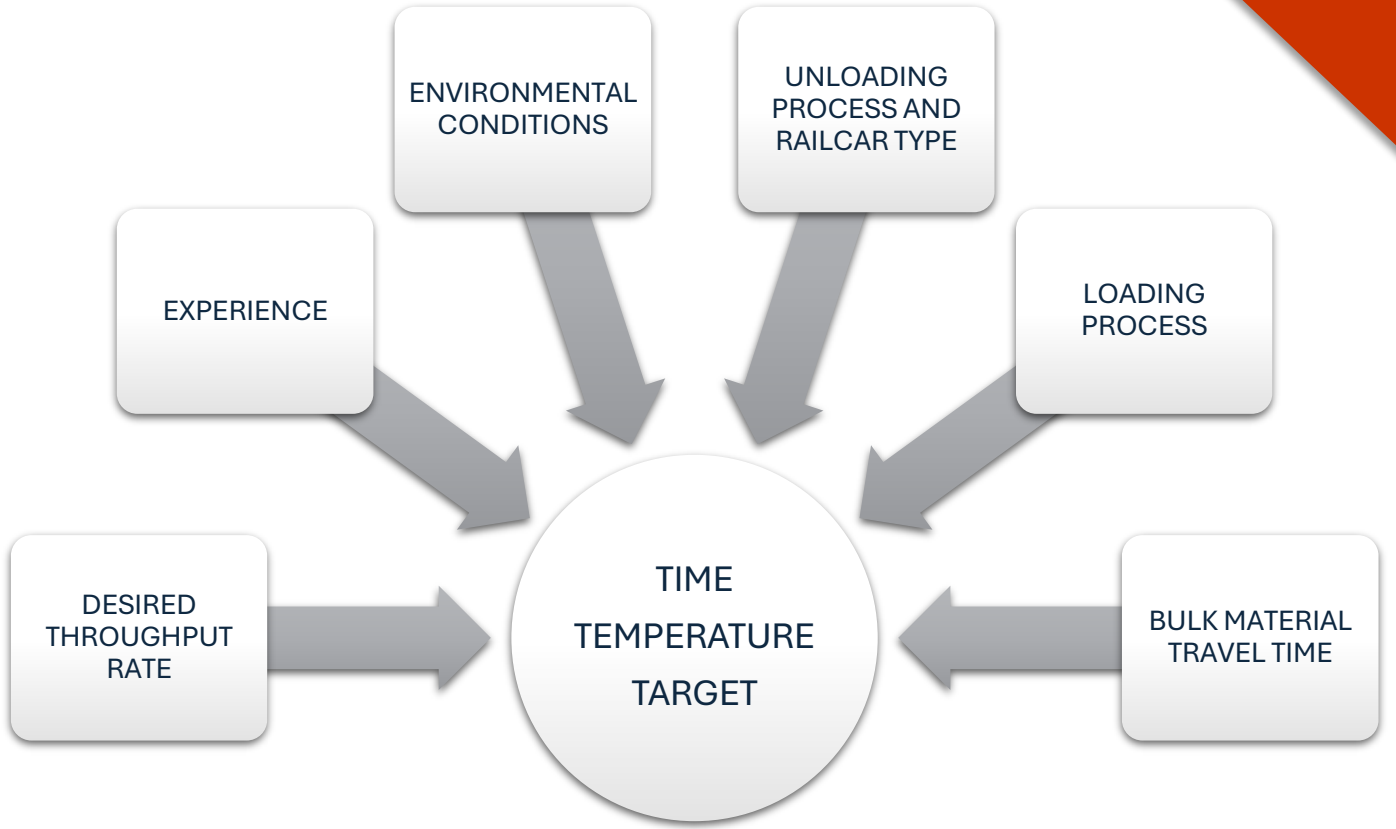
- AMOUNT OF TIME THE CAR IS BEING HEATED
- INCLUDES TRANSITIONAL PERIODS BETWEEN HEATING AND UNLOADING
- LONGER THE TIME, THE DEEPER THE HEAT WILL PENETRATE THE MATERIAL INSIDE THE RAILCAR

TEMPERATURE

- THE OUTSIDE OF THE RAILCAR
- TYPICALLY HELD BETWEEN 150 -250 F
- RAILCARS OFTEN HAVE TEMPERATURE RATINGS
- HEATERS NEED TO BE CONTROLLED TO KEEP THE RAILCAR AT THE HIGHEST POSSIBLE TEMPERATURE

TARGET

- OPTIMIZING HEAT PLACEMENT ON RAILCAR
- CONTROLLED THROUGH HEATER DESIGN AND LAYOUT
- NUMBER OF HEATERS PER STATION
- MINIMIZING HEAT LOSS DURING PROCESS



APEC THERMAL

BACKGROUND

APEC PROCESS

EXPERIENCE

PROJECT OVERVIEW

RAILCAR THAWING STUDY

BACKGROUND

CORE FOCUS

KEEP MOTION RELIABLE THROUGH HEAT

VALUES

WE ARE CUSTOMER CENTRIC
WE ARE RELIABLE
WE ARE INNOVATIVE

WHAT WE DO

DESIGN AND BUILD RAILCAR THAWING SYSTEMS
MANUFACTURE RAIL HEATING PRODUCTS FOR CLASS 1 RAILROADS

PARTNERS

Aitken Products, Inc.

ENERCO

TÜRK+HILLINGER THERMAL TECHNOLOGY

APEC PROCESS

APEC THERMAL

APEC ENGINEERING

- ENGINEERING FOCUSED COMPANY
- FOLLOW A STANDARDIZED APPROACH FOR ALL PROJECT
- DESIGN THE RIGHT SYSTEM FOR YOUR NEEDS

DEFINE → MEASURE → DESIGN → MANUFACTURE → IMPLEMENT

EXPERIENCE

MAJOR PROJECTS

- Sierra Pacific Power Company, North Valmy Generating Station, Valmy NV, USA
- PPL Brunner Island S.E. Generating Station, Danville PA, USA
- PPL Montour, Generating Station, York PA, USA
- NewPage, Biron Mill, Biron WI, USA
- Alliant Energy - Williams Bulk Transfer, Williams IA, USA
- Kinder Morgan Bulk Transfer, Newport News VA, USA
- PacificCorp Dave Johnston Generating Plant, Glenrock WY, USA
- ADM Corn Processing Facility, Columbus NE, USA
- Alcoa Warrick Generating Station, Newburgh IN, USA
- UC Rusal Anode Plant, LLC, Saint-Petersburg/Taishet Carbon Plant, Russia
- ADM Corn Processing Facility, Columbus NE, USA
- POSCO Engineering & Construction Co., Ulaanbaatar Thermal Power Plant, Mongolia
- Dominion, Mount Storm WV, USA
- Nova Scotia Power, Nova Scotia, Canada
- NIPSCO, Michigan City, IN, USA
- Industrial Mineral Product Supplier, Canton, OH, USA
- Industrial Mineral Product Supplier, Martins Ferry, OH, USA

PROJECT OVERVIEW

SMALL SYSTEM

- 20-60 MINUTE UNLOADING RATE
- BUDGETARY COST: $250K – $500K
  - DOES NOT INCLUDE INSTALLATION MATERIALS AND LABOR

MID-SIZE SYSTEM

- 15-30 MINUTE UNLOADING RATE
- BUDGETARY COST: $400K – $800K
  - DOES NOT INCLUDE INSTALLATION MATERIALS AND LABOR

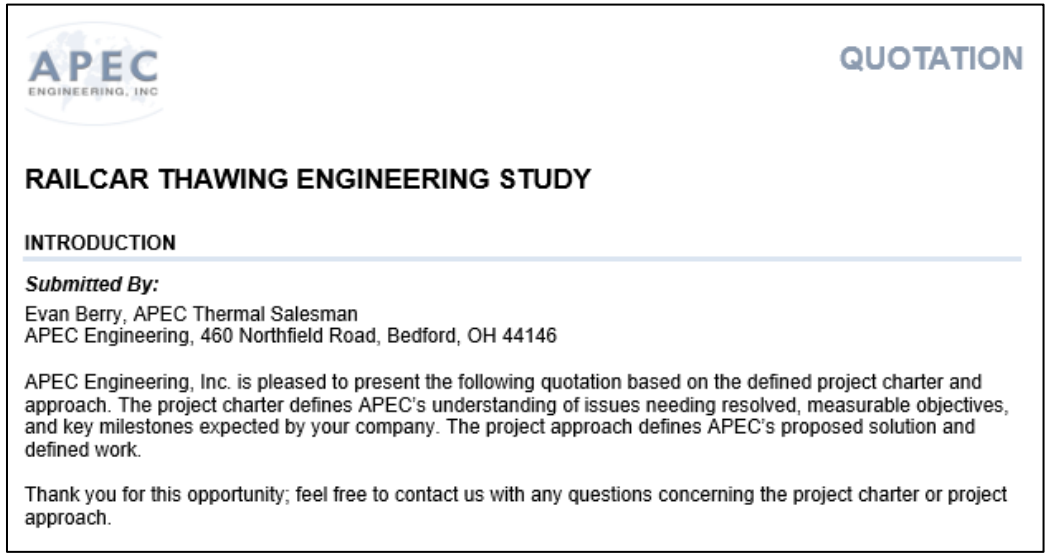
LARGE SYSTEM

- <10 MINUTE UNLOADING RATE
- BUDGETARY COST: $500K – $1.5M
  - DOES NOT INCLUDE INSTALLATION MATERIALS AND LABOR

RAILCAR THAW STUDY

DEEPER ANALYSIS TO MAKE A SMART DECISION

1. VOICE OF CUSTOMER AND SITE VISIT
2. THAW STUDY REPORT
3. CONCEPTUAL DRAWING
4. APEC THAW SYSTEM QUOTATION
5. SYSTEM INSTALLATION BUDGET



APEC ENGINEERING, INC

QUOTATION

RAILCAR THAWING ENGINEERING STUDY

INTRODUCTION

Submitted By:

Evan Berry, APEC Thermal Salesman
APEC Engineering, 460 Northfield Road, Bedford, OH 44146

APEC Engineering, Inc. is pleased to present the following quotation based on the defined project charter and approach. The project charter defines APEC's understanding of issues needing resolved, measurable objectives, and key milestones expected by your company. The project approach defines APEC's proposed solution and defined work.

Thank you for this opportunity; feel free to contact us with any questions concerning the project charter or project approach.

CONTACT

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