Public Roads Deicing Workshop

Contents:

About Küper (pronounced “Coop-er”)
– our company history & profile
– evolution of cutting edges (European)
– typical North American cutting edge styles and examples
– what are flexible blades - pro’s / con’s of each
– features of a good plow blade
– surface types, obstacles, what to expect
– goals, systems working together within means of operations, budget, etc.
– examples
Our company profile Who are we?

- Küper, a family business
- founded in 1957, more than 50 years of experience in plow blades
- 80 employees for a perfect mix of innovative ideas and reliable production
- 2 locations in Bochum, Germany
- New factory opened September, 2012
- partners worldwide
- “wear experts”

- Küper “Kueper” North America founded 2010, Imported since 2005
- Central U.S. Warehouse: Morley Missouri
- Sales in 45 States, 8 Provinces, 65+ Airports
- Direct Sales / Dealer Network
**Flexible and wear resistant products**

made of rubber, polyurethane and compounds

<table>
<thead>
<tr>
<th>PU-screen panels</th>
<th>Rubber panels</th>
<th>Snowplow blades</th>
<th>Wear parts</th>
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<tbody>
<tr>
<td>- wear resistant</td>
<td>- wear resistant</td>
<td>- wear resistant</td>
<td>- wear resistant wear parts for different industries</td>
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<tr>
<td>- anti plugging</td>
<td>- anti plugging</td>
<td>- for better cleaning</td>
<td>- made of rubber, PU, hard metal and ceramics</td>
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<tr>
<td>- flexible</td>
<td>- flexible</td>
<td>- for road surface protection</td>
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<tr>
<td>- different hardnesses and qualities</td>
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<td>- for screening abrasive and plugging materials like sand, gravel, minerals, etc.</td>
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Kueper: Evolution of Flexible Blades: 1967

- Squeegee
- reduction of road damage
- reduction of vibration
- stability of the rubber
- jumping of plow
- no aggressive plowing

Rubber blade
1971

Gigant blade

+ reduction of jumping
+ no bending of blade
+ low wear
+ reduction of road damage
+ reduction of vibration

- jumping of plow
- no aggressive plowing
1979

+ good sliding properties
+ reduction of jumping
+ reduction of fuel consumption
+ low wear
+ reduction of road damage
+ reduction of vibration

Combination blade with corundum inlays
1985

+ better sliding properties
+ longer wear life
+ reduction of fuel consumption
+ noise reduction
+ new design
  - no step from blade to plow
  - weight reduction
  - better for mounting
  - waste reduction
+ reduction of road damage
+ reduction of vibration

Kombi “S”
Features
combination blade made of high quality steel, rubber and tungsten-carbide inserts with:
– extreme wear-life
– great sliding properties
– minimized fuel consumption
– shock resistant

Application
– for all types of winter precipitation:
  – snow
  – slush
  – packed snow and ice
– for all road surfaces:
  – verglimit, open graded friction course, rubber asphalt, concrete
– for all snowplows:
  – one-way, high discharge, reversible

Recommended for
– country roads, highways
– motorways, freeways
– difficult road surfaces
GK 5 Hybrid Rubber: Rubber & Ceramic Inserts

Product features
- wear resistant rubber / ceramic blade offering
  - quietness and stability
  - good sliding properties – ceramics = reduced friction
  - ability to adapt and conform to road surface
  - long wear-life – ceramics = 8-10X over rubber
  - made in 3’, 4’ and 5’ sections
  - no faceplating required
  - no adjustment necessary

Application
- in wet snow
- obstacles in roadway – manhole rings, expansion joints, rail track
- raised pavement markers – will not damage
- brick pavers / specialty surface coatings
- for all snowplows

Recommended for
- urban areas
- obstacles
- Run at 90 degrees to the road

The clean and quiet blade....
North America Typical Blade Types:
Two Groups

- “Metal Edge”
  - Steel / Hardened Steel
  - “Single Edge” Carbide / Steel Cover or Backer
  - Flexible Carbide Systems
  - Other

- “Rubber Systems”
  - Rubber
  - Polyurethane
  - Hybrid Rubber
What do you use?

- Steel?
- Rubber with steel cover blade
- Carbide with steel cover blade
- WHY?
What are Flexible Flow Blades?

- Wear material typically embedded in rubber (carbide, ceramics, etc.)
- Rubber reduces shock, vibration and noise extending the wear life of the carbide
- Systems such as Kueper, Polarflex, Joma
- Some utilize adapter plates bolted to the plow moldboard, small sectional pieces and cover strapping to hold everything in place
- **Remember:** there is NO magic plow blade that does it all and magically scoops snow from deep ruts and potholes!
Blade Types: A “Give and Take”

- **Pro’s:**
  - Steel: Cuts well, not as brittle as plain carbide, inexpensive
  - Carbide: Cuts well, lasts longer than steel
  - Flexible Carbide: Cuts well, cleans well (conforms to the road better), lasts longer than regular carbide
  - Rubber: Cleans slush and wet snow very well, conforms to the road, better for obstacles in the road
  - Polyurethane: Cleans slush and wet snow, cuts better than rubber, conforms to the road, ok on obstacles, lasts longer than rubber
  - Hybrid Rubber: Cleans all types of snow except hard pack, conforms to the road, fine for obstacles, lasts longer, no maintenance

- **Con’s**
  - Steel: Can break, wears very quickly
  - Carbide: Does not conform well, must use cover blade, many imitations
  - Flexible Carbide: Can become damaged if misused, cannot use in gravel and dirt, expensive
  - Rubber: Wears quickly, chatters, jumps / hops the plow, requires a lot of adjustment, maintenance
  - Polyurethane: Wears quickly (though better than rubber), requires maintenance and adjusting / flipping
  - Hybrid Rubber: More expensive
Features of a good snowplow blade

- long wear-life = lower total cost over time
- good cleaning = **less salt required**
- no damage to road markings
  - no damage to raised pavement markings or other structures (i.e. manhole covers, bridge joints etc.)
- low friction = lower fuel cost
- noise / vibration reduction = less operator / equipment fatigue
- shock resistance, no damage to blade
  - no damage to plow assembly or vehicle. (i.e. alignment and other wearable parts)
- shock absorption = less wear on carbide / other wear parts
- easy changing = safety
- Recyclability
- few, if any, moving parts, adapter plates, etc.
- wear indicators = quick operator reference on blade life
  - long life reduces maintenance cost
Blade Testing: Solving Problems / Performance Metrics for Consideration

- Identify problems / issues: surface types, obstructions, operators (lol!!)
- Match blade types to solve priority issues and operational capabilities
- “Apples to Apples”
- Route, Operator, Road Surface Materials, Road Condition, Plow Weight, Treatment Options, Deice / Anti-ice
- Wear Life vs standard product (plow down mileage, hours)
- Performance / Cleaning
- Involve the stakeholders: operators, maintainers, financial folks
- Problem Solving
Considerations / Issues #1: Surface Types

- Asphalt
  - Dense Grade
  - Open Grade
  - Stone Matrix
- Concrete
- Repair and Patch
  - Seal Coats
  - Micro Surfacing
  - Crack Seals
  - Mill & Recycle
Considerations / Issues #2: Road Obstructions

Examples:
- Man Hole Rings
- Catch Basins
- Expansion Joints
- Pavement Markers
- Striping / Paint Markings
- Rail Track
- Cobblestone
- Decorative Pavers / crossings
- Curb
- Jersey Barrier
- Gravel Shoulder

Results:
- Broken Blades
- Broken Plow
- Broken Frame
- Broken Drivers
- Damaged roads
- Reapplying Markings
- Stained (Rust) streaks on stone or brick
Blades, Plows, Material Application: Working Together

– Goals:
  – De-ice? (burn and scrape)
  – Anti-Ice? (prevent and clean)

– Material on hand
  – Sand?
  – Salt?
  – Liquid?

– Doing the most with what you have in conjunction with conditions and surfaces:
  – Dry material only > de-ice scenario > scraping > steel / carbide blades
  – Obstacles > pre-treat (slurry) > anti-ice > rubberized
  – Higher Speeds > good surface > liquid & material > anti-ice > flexible carbide

– Other Considerations:
  – Fleet condition and capabilities
  – Plow condition, maintenance (worn springs, bent moldboards)
  – Other technologies used / monitored: weather data, pavement data, etc.
  – Post – storm team performance evaluations
  – Budget – short or long sighted
  – Procurement personnel
Identify other wear parts required: Curb guards/ plates / shoes / skids

KUEPER BLADE SAVER "PLATE":
Used on both reversible and one-way plows, can be placed along moldboard for protection and enhanced wear performance.

BLADE SAVER PLUS:
End guard "PLUS" moldboard shoe.
Increases wear life of Tuka blade system 20%.
Guards against irregular wear.
8100 / 4735 “Spread Miles” (NY DOT Spread Miles = Plowed miles). Plow #1 (one-way plow) plowed brand new asphalt, Plow #2 (reversible) concrete surface. Amazing Mileage, should last season 2013-2014. 2014: This one-way lasted to 14,000+ miles, other 6000+-
Massachusetts DOT: Initial Testing Installed
Fall 2011
Mass DOT: Conversion Started 2016
Maine DOT: Conversion Started 2016

Washington DOT: Oldest TUCA User
Washington DC: Problem: Obstructions and Rubber
Washington DC: Full Conversion
City of Chicago De-Icing: Problem: Typical rubber cannot withstand environment and de-icing
City of Chicago
Baltimore: Problem – rubber & caster damage
Baltimore: Post Blizzard of 2016 – Removal of casters with conversion
Denver: Problem: Obstructions - Tried 7 types of rubber and poly
Denver: Solution: Full Conversion GK 5 2013
Rochester NY: Problem – Obstructions and standard rubber
Thank you. Questions?