

Value Engineering Study

On Various Wiring Methods

May 29 – 30, 2003

Executive Summary

In order to support the various productivity initiatives currently happening at Interstates, the Value Engineering team completed a study to compare several wiring methods currently used in our industry to help determine the best wiring methods for a particular project or application. The team chose to study a recently constructed ethanol plant in order to determine possible savings for future ethanol construction.

After doing a cost breakdown of the cable and raceway portions of the project, we determined that studying the motor circuits would provide the most return on investment for the study. Therefore, the results of this study will not directly apply to control, lighting, and feeder wiring. However, the rules of thumb should provide some direction for making wiring decisions on your project.

After developing a list of feasible raceway options, the team compared these options using a decision matrix to find the best possible raceway solutions for this project. We then selected several solutions in order to do a detailed cost comparison. The options selected for the cost comparison are high-lighted in green.

Decision Matrix

| | Material Cost | Aesthetic Value | Manpower Peak Shaving | Installation Labor | Durability/Reliability | Expandability /Flexibility | Physical Space required | Material Lead Time | Noise Shielding | Tendency for Over-Fill | Score |
|--------------------------------|---------------|-----------------|-----------------------|--------------------|------------------------|----------------------------|-------------------------|--------------------|-----------------|------------------------|-------|
| Alternatives/Weight | 2 | 4 | 8 | 8 | 6 | 6 | 4 | 4 | 5 | 3 | 50 |
| Cable Tray w/ Tray Cable | 5 | 4 | 4 | 4 | 4 | 5 | 5 | 3 | 3 | 3 | 200 |
| Armor Cable | 3 | 2 | 2 | 5 | 5 | 4 | 4 | 2 | 4 | 5 | 183 |
| EMT w/ multi-conductor to MJB | 3 | 2 | 5 | 3 | 2 | 4 | 4 | 4 | 3 | 4 | 173 |
| EMT w/ single conductor to MJB | 3 | 2 | 5 | 3 | 2 | 4 | 4 | 4 | 3 | 4 | 173 |
| IMC w/ multi-conductor to MJB | 2 | 4 | 5 | 1 | 3 | 4 | 4 | 4 | 3 | 4 | 169 |
| IMC w/ single conductor to MJB | 2 | 4 | 5 | 1 | 3 | 4 | 4 | 4 | 3 | 4 | 169 |
| RGS w/ multi-conductor to MJB | 1 | 3 | 5 | 1 | 4 | 4 | 4 | 4 | 3 | 4 | 169 |
| RGS w/ single conductor to MJB | 1 | 3 | 5 | 1 | 4 | 4 | 4 | 4 | 3 | 4 | 169 |
| IMC w/ single conductor | 3 | 5 | 2 | 1 | 4 | 2 | 3 | 5 | 5 | 4 | 155 |
| RGS w/ single conductor | 2 | 4 | 2 | 1 | 5 | 2 | 3 | 5 | 5 | 4 | 155 |
| EMT w/ single conductor | 4 | 3 | 2 | 3 | 3 | 2 | 3 | 5 | 3 | 4 | 149 |

Note: Because material and labor are both "cost" criteria, the sum of their weightings should not be great than 10.

After the cost comparison was complete, one raceway method was the clear winner – **cable tray with armored cable**. And more importantly, this reduced cost does not come at the expense of quality or reliability! For a detailed explanation of the cost comparison, please contact Jaron Vande Hoef at 1-877-722-1664, ext 103.