FRONT END ENGINEERING DESIGN
BECAUSE COMPANIES DON'T KNOW WHAT THEY DON'T KNOW

FEED Process Delivers
Reduced Risk
Increased Development Speed
Ensured Alignment
Defined Success

…they did a good job in partnering with us and figuring out what needed to get done… We have a unique application and JBT did a good job of designing it so it would work for us.

Director Conversion Strategy, PMO
Confidential Client
Food & Beverage Warehouse

WHAT IS AN AGV?

An AGV is a computer-controlled and battery-powered load carrier that runs in a warehouse or on the plant floor without the need of an onboard operator or driver. AGVs can improve efficiency and productivity as well as reducing product damage and labor costs.

AGVs are useful in various operational applications such as pallet transportation of goods, loading and unloading, and are used in various end-use industries, which include healthcare, manufacturing, logistics & distribution, automotive, building products and food & beverage, and many others.

There are various types of AGVs, such as: tow vehicle, unit load carrier, forked vehicle and, assembly line vehicle.
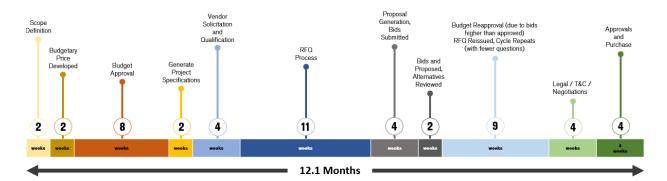
You want to automate material movement in your operations but you're not sure if AGVs are the right solution for your business needs and you're unsure of what exactly you need or how to specify what you need.

Let's look at what a typical scenario looks like when you don't have a formal RFP.

1. You contact several AGV vendors for a solution.

2. Each AGV vendor will provide a solution based upon **THEIR** ideas about what is best for you, potentially without ever sitting down with you to find out what you really need.

It is widely understood that designs are shaped mostly in the early conceptual design phase, where the most important decisions are being made. **(when the least amount of capital is being spent in the system design phase, but the most is being decided)** This is a dangerous scenario.

3

Scope Definition
- Customer knows they want to save money with AGVs.
- May or may not have experience / expertise to define what is feasible or cost effective.
- May or may not reach out to plants, vendors or consultants.

Budget approval
- Hope budget is correct and encompasses requirements.
- Questions from management requiring refinement.

Generate project specification
- Based on future higher speeds which would need more people.
- Uses existing staff levels for benefit cost analysis (ignoring higher throughput).
- Based on forklift or other "related" technologies we know.
- Classified: Not discussed with operations, IT, and safety groups.

Vendor solicitation and qualification
- Site visits & referrals.

Vendor Response
Internally:
- What they want is impossible!
- How can we change / manipulate this to our advantage?
- Questions to customer, trashing competitors.
- Responses to questions.
- Specification change and bid extension.

Can you relate to this scenario? Is this the typical process you and your team go through?

Note: the financial cost and expenses associated with the timeline has not been reviewed or reflected in this business case but as you know, each step includes people overhead costs, travel & expenses, etc. Time is money, and in this scenario it's a lot of money!

JBT FRONT END ENGINEERING DESIGN PROCESS

The purpose of FEED is to help you Reduce Risk, Increase Development Speed, Ensure Alignment & Define Success.
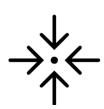
How does the FEED **process reduce risk?**

1. Identifies your business case correctly.
2. Captures all potential savings.
3. It accounts for internal/systemic changes in your organization.
4. Identifies and mitigates the risks before the purchase order, which speeds up the approval process and gets you to the realization of the ROI faster.

How does the FEED process **increase development speed?**

Collaborative efforts from both JBT and client are made to identify actual project needs up front so there are no surprises.

How does the FEED process **ensure alignment?**

The pre-engineering process of YOUR solution is built on data and JBT's proprietary simulator where the client and our software team will have the opportunity to optimize and iterate the solution. *Wouldn't it be great to find out that you can eliminate 1 more AGV before purchasing the system?* The FEED process exposes data discrepancies.
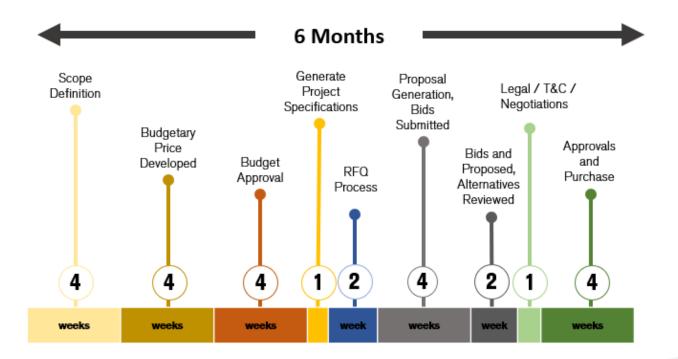We help our clients understand their own data, so the vehicle counts project costs are correct.

How does the FEED process **define success?**

1. The FEED process creates an opportunity for both parties to be honest about project goals and success criteria. The solution is then tailored and optimized to the business case objectives assuring no huge change orders.

You want all these things, but you cannot get them until the system is designed and you cannot get the system designed until you commit to a partner. That's where partnering with JBT and utilizing the FEED process is the perfect solution.

There are three FEED phases:

1. FEED 0 – Rough Order of Magnitude (ROM)

2. FEED 1 – Budgetary Proposal

3. FEED 2 – Firm Proposal

FEED PHASES DEFINED

The FEED process begins with a Rough Order of Magnitude (ROM) which rapidly identifies the viability of a project from an ROI point of view and a conceptual design and layout that expends sufficient resources to move onto the FEED 1 stage.

FEED 0 (ROM) takes approximately 1 week to complete and delivers:

1 week

1) A conceptual solution
2) An estimated AGV count
3) And an ROI Summary

FEED 1 each party (You and JBT) expends resources to complete the due diligence process, avoiding the over-commitment by either party.

FEED 1 is NOT a fully designed and engineered solution as this would result in an over extension of estimating resources.

FEED 1 takes approximately 4 weeks to complete and delivers:

4 weeks

1) A description of operations
2) A conceptual layout and AGV count
3) A conceptual software and hardware interface
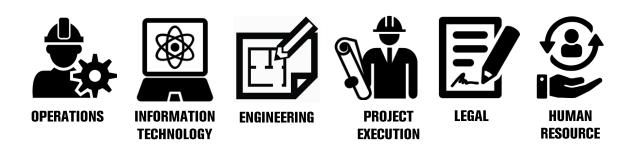4) And a budgetary proposal & estimated project schedule.

Once FEED 1 is agreed upon and the customer decides to partner with JBT. Both parties commit to expend more resources to move onto FEED 2 phase.

FEED 2 commences with a purchase order to fund the FEED-2 stage. This financial commitment is only large enough to complete the work of FEED-2.

The Focus is to eliminate risks to both parties through deep and thorough technical staff interaction from both parties.

In the FEED 2 stage each party is now willing to commit more resources now that a partner selection and funding has occurred.

FEED 2 kicks off with a 2-to-3-day face-to-face meeting with attendees from both sides to discuss in depth the following areas of the project:

OPERATIONS **INFORMATION TECHNOLOGY** **ENGINEERING** **PROJECT EXECUTION** **LEGAL** **HUMAN RESOURCE**

Attendees required to be present at the meeting:

CUSTOMER	JBT
Project Manager	Sales Manager
Management Representative	Management Representative
Operations Representative	Applications Engineer
IT Representative	Project Manager
Engineering/Maintenance Representative	Director of Engineering
Procurement Lead	Director of Software Engineering
Scribe	Field Engineering
	Vehicle Engineering Manager

The purpose of this face-to-face meeting is to review and discuss every aspect of he project and to make sure there is no stone left unturned avoiding future project change orders.

The FEED 2 process takes about 8-12 weeks to complete and delivers:

8-12 weeks

1) Description of the operations

2) Mathematical simulation of an AGV count

3) Finalized road system and layout

4) Software and hardware interface definition

5) Fixed price proposal

6) Finalized project schedule

7) Agreed upon terms and conditions

AT THE END OF THE DAY

You ONLY commit to paying **10%** of the budgetary proposal

10%

Budgetary Proposal

JBT will provide a detailed:

✓ Description of Operation
✓ Functional Specification
✓ Terms of Sale
✓ Project Schedule
✓ Firm Fixed Price

…they are a leader in the industry. They know their business. They know their applications. I appreciate their safety. They are a very safety-minded organization.

Director of Engineering
Confidential Client
Food & Beverage Warehouse