



# Fabrication ESTmep 2016

## The Basics - Getting Started

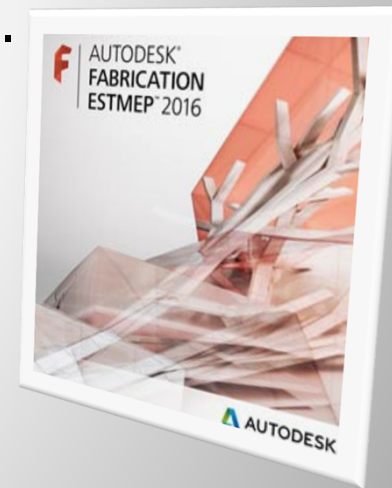
Dave Mangham – A.G.Coombs  
Senior Project Draftsman



## Class summary

This class is a basic introduction in Fabrication ESTmep 2016 software for the beginner. We will explore the software from opening it to producing estimates based on a designer's PDF background. We will manipulate spreadsheet data and import into the Fabrication ESTmep environment. We will also set up fabrication and labour tables and mapping to service buttons.

You will also learn how to create simple material and labour reports based on an imported vector PDF design drawing. Basic working knowledge of ESTmep would be advantageous if attending this demo.



# Key learning objectives

At the end of this Instructional demo, you will have an insight into:

- Importing supplier data to the product information editor and database price lists.
- Setting up fabrication and install labour tables.
- Creating Ancillary Kits from ancillaries.
- Creating simple reports based on duct and pipe trace of designer's vector PDF

# About the Speaker



Originally from Ramsbottom, in the North West of England Dave worked in both the CAM & CAD departments for a large HVAC construction company, instrumental in the development of MAP's CADDuct software.

He spent a period working at MAP as their CAD support manager before moving to an HVAC contractor as a project engineer. He then spent 5 years cutting his teeth at a global multi disciplinary design practice in central Manchester.

Following a move to Melbourne 4½ years ago Dave has spent the last 2 years configuring & deploying Autodesk's Fabrication ESTmep for A.G. Coombs.

He brings over 25 years experience in the M.E.P. construction / design industry to  
AU 2015



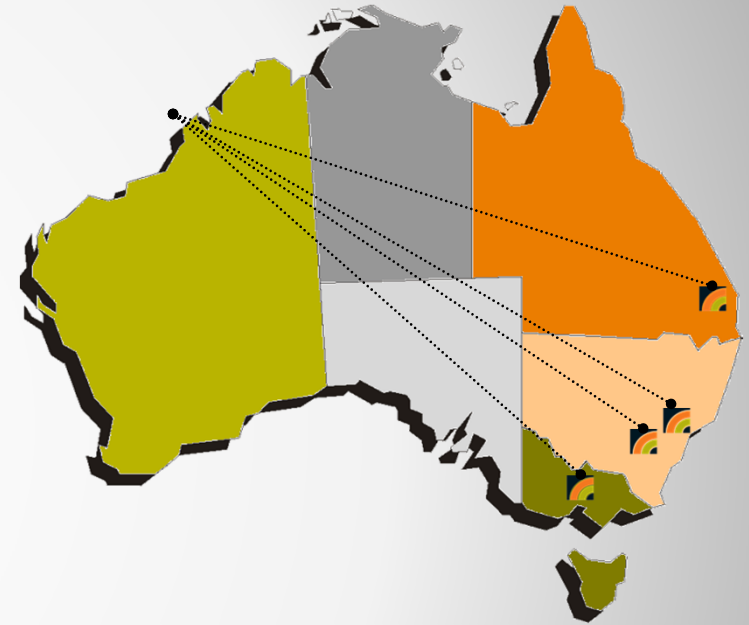
# A.G. Coombs Group of Companies



- **Whole of life Building Services specialists**
  - HVAC, Mechanical, Plumbing, Electrical, Fire, Building Technologies
  - All Technical systems from Concept & Design to Operation
  - Innovative Delivery, Engineering led
- **500+ Staff & technical personnel**
  - Melbourne, Sydney, Canberra, Brisbane
  - National Capability

# A.G. COOMBS GROUP

- Privately Owned Corporate
- Establishment in **1945**
- Self Deliver Model
- Melbourne, Sydney and Brisbane
- The A.G. Coombs Group directly employs more than **550** personnel



INTEGRATED  
TECHNICAL  
MANAGEMENT



[techfm.com.au](http://techfm.com.au)



A.G.Coombs

[agcoombs.com.au](http://agcoombs.com.au)



walker  
FIRE PROTECTION

[walkerfire.com.au](http://walkerfire.com.au)



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AUTODESK.

A.G. COOMBS PRE FAB









# DUCTMAKERS

- 2 plasma lines
- 1 Vicon coil line
- 160 Tonnes / month
- 5000m<sup>2</sup> Insulation / month



A.G.Coombs



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 AUTODESK.



# A.G. COOMBS PROJECTS

- Health Care and Pharmaceutical
- Commercial / Tenancies
- Data Centres
- Performing Arts
- Cogeneration
- Energy Efficiency Upgrades







**DARLING  
HARBOUR  
LIVE**





# Barangaroo



# Software Packages Utilised

- ADSK Building Ultimate Suite (Revit / Navis Manage)
- ADSK CADmep / ESTmep
- Great Plains
- MS Office 365
- MS Project
- VDI
- Wennsoft

## Business Process Change – Why Implement ESTmep?

- Where we were – QuickPen – DOS based stand alone PC's
- Integrate our Estimating, Design and Project Management Cost Control
- We needed to understand our costs better
- We needed to implement more efficient business processes.
- ESTmep – CADmep – CAMduct Integration.
- Native Fabrication ITM's in Revit 2016 & beyond
- Variations & Cost Analysis



## A.G. Coombs

### Plan Ahead – Pre Setup

- Right people in place prior to setup.
- Management support
- Senior Estimator
- Technical Leader
- Support resource



# Learning Objective 1

## Managing Supplier Price Lists

- Configuring Excel Supplier Price Lists

ESTMEP UPDATE CSV FILE FORMAT												
1	2	3	4	5	6	7	8	10	11	12	13	
Product ID	Product Name	Size	Supplier	Manufacturer	Manufacturer Product Code	Description	Selling Units	Material	Specification	Weight Selling Unit	Install Type	
Mandatory	If Applicable	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	Mandatory	If Applicable	If Applicable	If Applicable	If Applicable	
1006430	TA STAD	10	REECE	TA	52151009	TA STAD BALANCING VALVE PN20	Ea	BRONZE(AMETAL)	2000KPA/120°C	0.6	THREADED	
1006431	TA STAD	15	REECE	TA	52151014	TA STAD BALANCING VALVE PN20	Ea	BRONZE(AMETAL)	2000KPA/120°C	0.7	THREADED	
1006432	TA STAD	20	REECE	TA	52151020	TA STAD BALANCING VALVE PN20	Ea	BRONZE(AMETAL)	2000KPA/120°C	0.7	THREADED	
1006433	TA STAD	25	REECE	TA	52151025	TA STAD BALANCING VALVE PN20	Ea	BRONZE(AMETAL)	2000KPA/120°C	0.9	THREADED	
1006434	TA STAD	32	REECE	TA	52151032	TA STAD BALANCING VALVE PN20	Ea	BRONZE(AMETAL)	2000KPA/120°C	1.2	THREADED	
1006435	TA STAD	40	REECE	TA	52151040	TA STAD BALANCING VALVE PN20	Ea	BRONZE(AMETAL)	2000KPA/120°C	1.4	THREADED	
1006436	TA STAD	50	REECE	TA	52151050	TA STAD BALANCING VALVE PN20	Ea	BRONZE(AMETAL)	2000KPA/120°C	2.3	THREADED	
1006450	TA STAF	65	REECE	TA	52181065	TA STAF BALANCING VALVE PN16	Ea	CAST IRON	1600KPA/120°C	12.4	FLANGED	
1006455	TA STAF	80	REECE	TA	52181080	TA STAF BALANCING VALVE PN17	Ea	CAST IRON	1600KPA/120°C	15.9	FLANGED	
1006460	TA STAF	100	REECE	TA	52181090	TA STAF BALANCING VALVE PN18	Ea	CAST IRON	1600KPA/120°C	22.0	FLANGED	
1006465	TA STAF	125	REECE	TA	52181091	TA STAF BALANCING VALVE PN19	Ea	CAST IRON	1600KPA/120°C	32.7	FLANGED	
1006470	TA STAF	150	REECE	TA	52181092	TA STAF BALANCING VALVE PN20	Ea	CAST IRON	1600KPA/120°C	42.4	FLANGED	
1006584	TA STAG - PN25	65	REECE	TA	52183076	TA STAG BALANCING VALVE GROOVED PN25	Ea	DUCTILE IRON	2500KPA/120°C	6.4	GROOVED	
1006585	TA STAG - PN25	80	REECE	TA	52183089	TA STAG BALANCING VALVE GROOVED PN25	Ea	DUCTILE IRON	2500KPA/120°C	9.1	GROOVED	
1006586	TA STAG - PN25	100	REECE	TA	52183114	TA STAG BALANCING VALVE GROOVED PN25	Ea	DUCTILE IRON	2500KPA/120°C	14.0	GROOVED	
1006587	TA STAG - PN25	125	REECE	TA	52183140	TA STAG BALANCING VALVE GROOVED PN25	Ea	DUCTILE IRON	2500KPA/120°C	22.7	GROOVED	
1006589	TA STAG - PN25	150	REECE	TA	52183165	TA STAG BALANCING VALVE GROOVED PN25	Ea	DUCTILE IRON	2500KPA/120°C	31.3	GROOVED	
1006602	TA STAG - PN25	200	REECE	TA	52183219	TA STAG BALANCING VALVE GROOVED PN25	Ea	DUCTILE IRON	2500KPA/120°C	63.5	GROOVED	
1006603	TA STAG - PN25	250	REECE	TA	52183273	TA STAG BALANCING VALVE GROOVED PN25	Ea	DUCTILE IRON	2500KPA/120°C	92.0	GROOVED	
1006604	TA STAG - PN25	300	REECE	TA	52183324	TA STAG BALANCING VALVE GROOVED PN25	Ea	DUCTILE IRON	2500KPA/120°C	127.0	GROOVED	

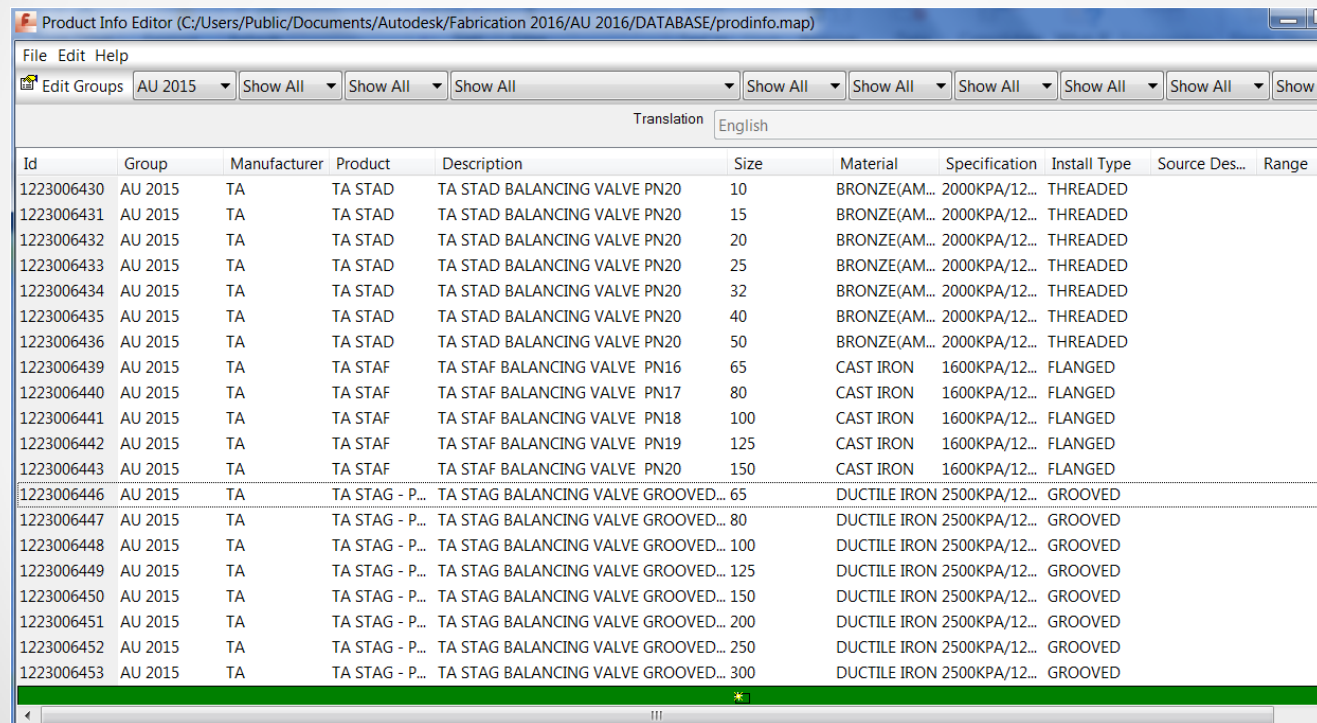
Supplier price lists standardised & configured to suit ESTmep interface.



# Learning Objective 1

## Managing Supplier Price Lists

- Populating the Product Information Editor.



The screenshot shows the 'Product Info Editor' window with a menu bar (File, Edit, Help) and a toolbar with 'Edit Groups' and several 'Show All' buttons. Below the toolbar is a 'Translation' dropdown set to 'English'. The main area contains a table with the following columns: Id, Group, Manufacturer, Product, Description, Size, Material, Specification, Install Type, Source Des..., and Range. The table lists 20 products, primarily 'TA STAD' and 'TA STAG' balancing valves, with various sizes and materials like BRONZE and DUCTILE IRON.

Id	Group	Manufacturer	Product	Description	Size	Material	Specification	Install Type	Source Des...	Range
1223006430	AU 2015	TA	TA STAD	TA STAD BALANCING VALVE PN20	10	BRONZE(AM...	2000KPA/12...	THREADED		
1223006431	AU 2015	TA	TA STAD	TA STAD BALANCING VALVE PN20	15	BRONZE(AM...	2000KPA/12...	THREADED		
1223006432	AU 2015	TA	TA STAD	TA STAD BALANCING VALVE PN20	20	BRONZE(AM...	2000KPA/12...	THREADED		
1223006433	AU 2015	TA	TA STAD	TA STAD BALANCING VALVE PN20	25	BRONZE(AM...	2000KPA/12...	THREADED		
1223006434	AU 2015	TA	TA STAD	TA STAD BALANCING VALVE PN20	32	BRONZE(AM...	2000KPA/12...	THREADED		
1223006435	AU 2015	TA	TA STAD	TA STAD BALANCING VALVE PN20	40	BRONZE(AM...	2000KPA/12...	THREADED		
1223006436	AU 2015	TA	TA STAD	TA STAD BALANCING VALVE PN20	50	BRONZE(AM...	2000KPA/12...	THREADED		
1223006439	AU 2015	TA	TA STAF	TA STAF BALANCING VALVE PN16	65	CAST IRON	1600KPA/12...	FLANGED		
1223006440	AU 2015	TA	TA STAF	TA STAF BALANCING VALVE PN17	80	CAST IRON	1600KPA/12...	FLANGED		
1223006441	AU 2015	TA	TA STAF	TA STAF BALANCING VALVE PN18	100	CAST IRON	1600KPA/12...	FLANGED		
1223006442	AU 2015	TA	TA STAF	TA STAF BALANCING VALVE PN19	125	CAST IRON	1600KPA/12...	FLANGED		
1223006443	AU 2015	TA	TA STAF	TA STAF BALANCING VALVE PN20	150	CAST IRON	1600KPA/12...	FLANGED		
1223006446	AU 2015	TA	TA STAG - P...	TA STAG BALANCING VALVE GROOVED...	65	DUCTILE IRON	2500KPA/12...	GROOVED		
1223006447	AU 2015	TA	TA STAG - P...	TA STAG BALANCING VALVE GROOVED...	80	DUCTILE IRON	2500KPA/12...	GROOVED		
1223006448	AU 2015	TA	TA STAG - P...	TA STAG BALANCING VALVE GROOVED...	100	DUCTILE IRON	2500KPA/12...	GROOVED		
1223006449	AU 2015	TA	TA STAG - P...	TA STAG BALANCING VALVE GROOVED...	125	DUCTILE IRON	2500KPA/12...	GROOVED		
1223006450	AU 2015	TA	TA STAG - P...	TA STAG BALANCING VALVE GROOVED...	150	DUCTILE IRON	2500KPA/12...	GROOVED		
1223006451	AU 2015	TA	TA STAG - P...	TA STAG BALANCING VALVE GROOVED...	200	DUCTILE IRON	2500KPA/12...	GROOVED		
1223006452	AU 2015	TA	TA STAG - P...	TA STAG BALANCING VALVE GROOVED...	250	DUCTILE IRON	2500KPA/12...	GROOVED		
1223006453	AU 2015	TA	TA STAG - P...	TA STAG BALANCING VALVE GROOVED...	300	DUCTILE IRON	2500KPA/12...	GROOVED		

A one off exercise populating the P.I.E. with supplier data.

# Learning Objective 1

## Managing Supplier Price Lists

- Populating a Database Price List

Configuration Manufacturing Fittings Takeoff Costing

Cost Methods  
Wastage  
Overheads  
Table  
Price Lists  
Fabrication Times  
Installation Times  
Labour Rates  
Fixed Costs  
Cost Analysis

Supplier Group: AU 2015  
Carriage: 0.0 (%)  
Material Overheads: 0.0 (%)  
Price List: VALVES  
Generic Name:   
Original Pricing: None

Id	Cost	Discount	Units	Date	Status	Description	Group	Install Type
1223006430	75.80		(each)	13/08/2014	Active	TA STAD BALANCING VALVE PN20	AU 2015	THREADED
1223006431	89.79		(each)	13/08/2014	Active	TA STAD BALANCING VALVE PN20	AU 2015	THREADED
1223006432	110.92		(each)	13/08/2014	Active	TA STAD BALANCING VALVE PN20	AU 2015	THREADED
1223006433	119.13		(each)	13/08/2014	Active	TA STAD BALANCING VALVE PN20	AU 2015	THREADED
1223006434	139.82		(each)	13/08/2014	Active	TA STAD BALANCING VALVE PN20	AU 2015	THREADED
1223006435	184.21		(each)	13/08/2014	Active	TA STAD BALANCING VALVE PN20	AU 2015	THREADED
1223006436	210.04		(each)	13/08/2014	Active	TA STAD BALANCING VALVE PN20	AU 2015	THREADED
1223006439	475.14		(each)	13/08/2014	Active	TA STAF BALANCING VALVE PN16	AU 2015	FLANGED
1223006440	817.61		(each)	13/08/2014	Active	TA STAF BALANCING VALVE PN17	AU 2015	FLANGED
1223006441	1341.78		(each)	13/08/2014	Active	TA STAF BALANCING VALVE PN18	AU 2015	FLANGED
1223006442	2025.21		(each)	13/08/2014	Active	TA STAF BALANCING VALVE PN19	AU 2015	FLANGED
1223006443	2531.60		(each)	13/08/2014	Active	TA STAF BALANCING VALVE PN20	AU 2015	FLANGED
1223006446	168.81		(each)	13/08/2014	Active	TA STAG BALANCING VALVE GROOVED PN25	AU 2015	GROOVED
1223006447	617.12		(each)	13/08/2014	Active	TA STAG BALANCING VALVE GROOVED PN25	AU 2015	GROOVED
1223006448	786.73		(each)	13/08/2014	Active	TA STAG BALANCING VALVE GROOVED PN25	AU 2015	GROOVED
1223006449	808.60		(each)	13/08/2014	Active	TA STAG BALANCING VALVE GROOVED PN25	AU 2015	GROOVED

Import your supplier prices into the ESTmep database price list section.



# Learning Objective 2

## Setting up Fabrication & Labour Tables

- Pre-determine your data

The image shows a large, complex fabrication table with multiple sections and columns. The table is divided into several main sections, each with its own set of columns and rows. The sections are labeled as follows:

- Radius Bend** (Columns: A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z)
- Radius Offset** (Columns: A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z)
- Transition** (Columns: A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z)
- Mixed Offset** (Columns: A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z)
- Mixed Offset Part Face** (Columns: A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z)

The table is designed to provide a comprehensive overview of the data required for setting up fabrication and labour tables. It includes a wide range of data points, including dimensions, materials, and other relevant information. The table is presented in a 3D perspective view, highlighting its complexity and the large amount of data it contains.



## Learning Objective 2

### Setting up Fabrication & Labour Tables

- Determine your parameters for break points.

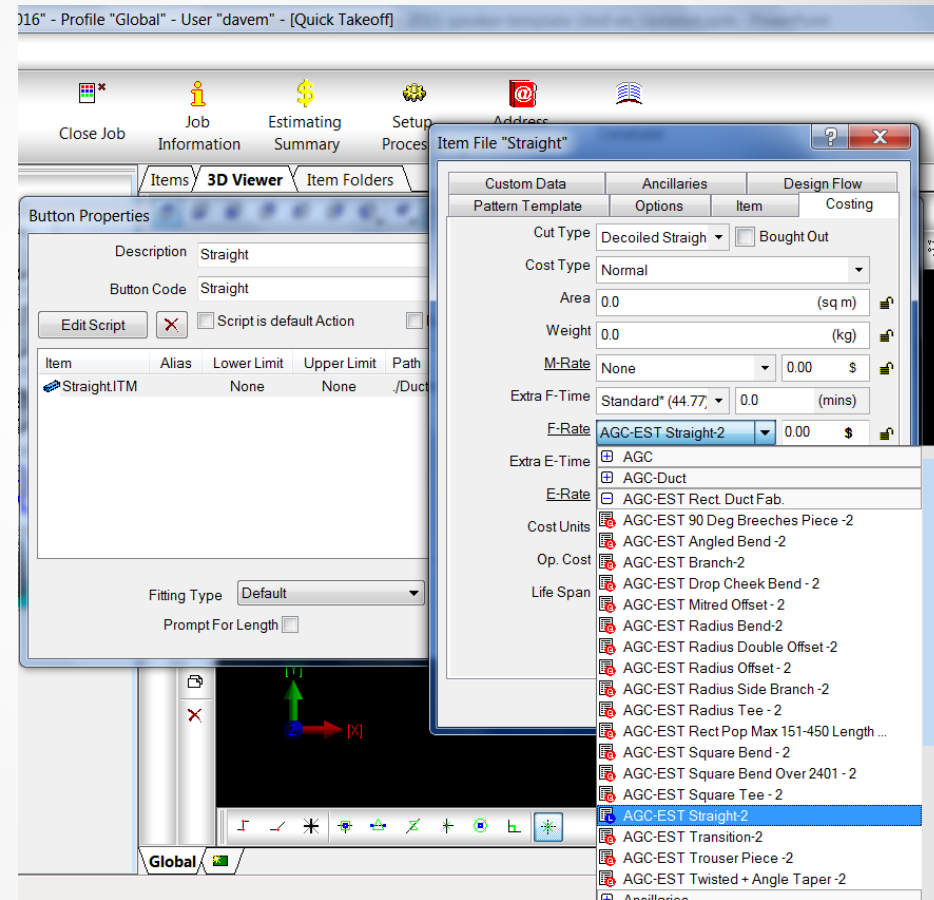
The screenshot shows the 'Database' window with the 'Costing' tab selected. The left sidebar lists various cost-related items, with 'Fabrication Times' highlighted. The main area displays the 'Table' dropdown set to 'AGC-EST Straight-2'. Below this, the 'Breakpoints' section shows two rows: 'Full Periphery <=' with a unit of '(m)' and 'Gauge <=' with a unit of '(mm)'. An 'Adjust Code' dropdown is also present. At the bottom, the 'Labour' section shows 'Standard' as the selected option, 'Units' as '(mins)', and 'Include if' set to 'Always' and 'As Small Lengt'. A table at the bottom displays values for different lengths: 0.6, 0.8, 1.0, 1.2, 1.6, and 2.0.

Labour	Standard	Units	(mins)	Include if	Always	As Small Lengt	
		0.6	0.8	1.0	1.2	1.6	2.0

# Learning Objective 2

## Setting up Fabrication & Labour Tables

- Mapping buttons with tables.







# Learning Objective 3

## Ancillaries & Kits

- Pre-determine kit requirements

	A	B	C	D	E	F	G	H	I	J	K
6	Copper	Spacings						CHW			HHW
7	Nominal pipe size (mm)	Pipe (m)	Hanger rod diameter (mm)	Hanger rod length (m)	Flexistrut Clevis	Clamp type	Insulation Thickness (mm)	Flexistrut clamp	Insulation Thickness	Labour (HR)	Flexistrut clamp
8	15	1	10	1	FM153-M10	BAND	38	FM123-015E	25	0.48	FM123-015D
9	20	1.5	10	1	FM153-M10	BAND	38	FM123-020E	25	0.48	FM123-020D
10	25	2	10	1	FM						
11	32	2.5	10	1	FM						
12	40	2.5	10	1	FM						
13	50	2.5	10	1	FM						
14	65	2.5	12	1	FM						
15	80	3	12	1	FM						
16	100	3	16	1	FM						
17	125	3	16	1	FM						
18	150	3	20	1	FM						
19	200	4	20	1	FM						
20											
21	Steel										
22	Nominal pipe size (mm)	Pipe (m)	Hanger rod diameter (mm)	Hanger rod length (m)	Flexis						
23	15	2	10	1	FM						
24	20	2	10	1	FM						
25	25	2.5	10	1	FM						
26	32	3	10	1	FM						
27	40	3	10	1	FM						
28	50	3	10	1	FM						
29	65	3	12	1	FM						
30	80	4	12	1	FM						
31	100	4	16	1	FM						
32	125	4	16	1	FM						
33	150	4	20	1	FM						
34	200	5	20	1	FM						
35	250	5	25	1	FM						
36	300	5	25	1	FM						
37	350	5	25	1	FM						
38	400	5	25	1	FM						
39	450	5	25	1	FM						
40	500	5	25	1	FM						
41	600	5	25	1	FM						
42											

	A	B	C	D	E	F
1						
2		Pair of Table "E" flanges				
3	N.B	Bolts No off	Bolt Dia & length	Nuts	Washers	Gasket
4	65	4	M16 X 50	4	8	Yes
5	80	4	M16 X 50	4	8	Yes
6	100	8	M16 X 50	8	16	Yes
7	125	8	M16 X 50	8	16	Yes
8	150	8	M20 X 60	8	16	Yes
9	200	8	M20 X 80	8	16	Yes
10	250	12	M20 X 80	12	24	Yes
11	300	12	M20 X 80	12	24	Yes
12	350	12	M24 X 100	12	24	Yes
13	400	12	M24 X 100	12	24	Yes
14	450	16	M24 X 100	16	32	Yes
15	500	16	M24 X 130	16	32	Yes
16	600	16	M30 X 160	16	32	Yes
17						

# Learning Objective 3

## Ancillaries & Kits

- Compile table of ancillaries.
- Build your kits.

Ancillary Kit

Name: TABLE-E STRAINER

Current Breakpoint: <= 65.0

Type	Name	Qty	Length	Units	Width	Depth
Fixings	M16x65mm NUT&BOLT	4				
Fixings	16mm WASHER	8				
Gasket	TABLE-E Gasket	1	Auto	(m)	Auto	Auto
Ancillary Materials	HAWKINS PASTE	1	Auto	(m)	Auto	Auto

OK Cancel

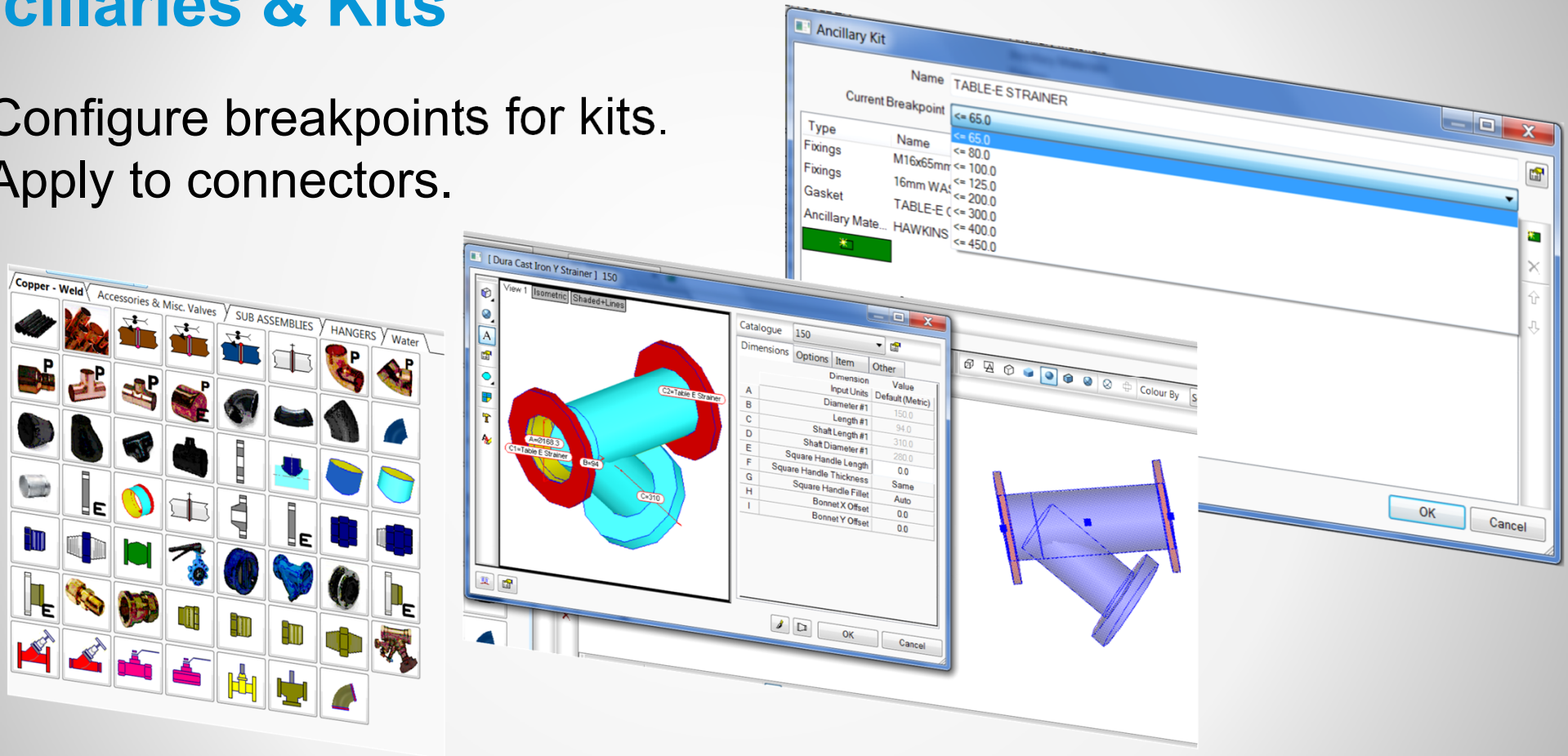
Type of Ancillary: Gasket

Description	Owner	Product Id
AGC PIPE GASKET		
HAWKINS PASTE	Breakpoints	
PN16 65mm Gasket		1113184
PN16 Gasket	Breakpoints	
TABLE-E 65mm Gasket		1113230
TABLE-E 80mm Gasket		1113235
TABLE-E 100mm Gasket		1113240
TABLE-E 125mm Gasket		1113245
TABLE-E 150mm Gasket		1113250
TABLE-E 200mm Gasket		1113254
TABLE-E 250mm Gasket		1113256
TABLE-E 300mm Gasket		1113257
TABLE-E 350mm Gasket		1113764
TABLE-E 400mm Gasket		1113765
TABLE-E 450mm Gasket		1113891
TABLE-E 500mm Gasket		1113892
TABLE-E 600mm Gasket		1113893

# Learning Objective 3

## Ancillaries & Kits

- Configure breakpoints for kits.
- Apply to connectors.





# Learning Objective 4

## Creating Simple Reports

- Pre-determine required data to report out.  
Map out what you want to see in your report.

	A	B	C	D	E	F	G	H
1	Ductwork							
2	Service	Material	Guage	Size	Length	Sqr /m	Fab Time	Install Time
3								
4	Hangers	Rod	Support	Nuts				
5								
6	Ancillaries	Bolts	Clips	Tape				
7								
8	Pipework							
9	Service	Material		Dia	Length	Qty	Price	Install Time
10								



# Learning Objective 4

## Creating Simple Reports

- Populate your Job Information.

The screenshot shows a software window titled "Job Information - Untitled19". It contains several sections for data entry:


- Job Information:**
  - Job Description: VEGAS AU2015
  - Drawing Number: 12345
  - Draftsman: [empty]
- Project Information:**
  - Project Number: ESTmep 2016
  - Drawing Revision: A
  - Floor: Level 1
  - Drawing Zone/Area: [empty]
  - System: [empty]
  - Project Manager: [empty]
  - Project Draftsman: [empty]
  - Engineer: [empty]
  - Site Manager: [empty]
- Schedule Details:**
  - Damper Supplier: [empty]
  - Register Supplier: [empty]
  - Fire Damper Supplier: [empty]
  - Piping Supplier: [empty]
  - Pipe Fitting Supplier: [empty]
  - Damper Schedule No.: [empty]
  - Register Schedule No.: [empty]
  - Fire Damper Schedule No.: [empty]
  - Piping Schedule No.: [empty]
  - Pipe Fitting Schedule No.: [empty]
  - Damper Schedule Rev: [empty]
  - Register Schedule Rev: [empty]
  - Fire Damper Schedule Rev: [empty]
  - Piping Schedule Rev: [empty]
  - Pipe Fitting Schedule Rev: [empty]
- Estimating Details:**
  - Date: 15/11/2015
  - Customer Name: [empty]
  - Prepared By: Dave
  - Approved By: [empty]
  - Accepted By: [empty]

At the bottom right are "OK" and "Cancel" buttons. A standard Windows taskbar is visible at the bottom of the window.

# Learning Objective 4

## Creating Simple Reports

- Configure your Report Header and report fields.



PROJECT NAME: AU VEGAS 2015

Drawing Number: 12345

Drawing Revision: A

Prepared By: Dave

Drawing Date: 02.12.15

Approved By:

Accepted By:

Decoil Straights: Material: Galv											
Duct Gauge (mm)	Duct Area (sq. m)	Duct Weight (kg)	Shop Hours	\$ Shop Labour Cost	\$ Shop Material Cost	\$ Total Shop Cost		Install Hours	\$ Install Cost		\$ Total Supply & Install Cost
0.6	139.5	634.5	18.07	878.25	2,215.86	2,354.22		57.11	6,171.97		7,963.20
	139.5	634.5	18.07	878.25	2,215.86	2,354.22		57.11	6,171.97		7,963.20



# Summary

- Plan ahead
- Compile all your data
- Have the right team in place
- Formulate a strategy
- Set deadlines / Goals
- Don't get side-tracked
- Focus on 1 aspect at a time
- Test & Validate before Rollout

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# More Questions? Visit the AU Answer Bar

- Seek answers to all of your technical product questions by visiting the [Answer Bar](#).
- Open daily 8am-10am and Noon-6pm and located just outside of Hall C on Level 2.
- Staffed by Autodesk developers, QA, & support engineers ready to help you through your most challenging technical questions.



